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# Journal of the Society of Arts.

FRIDAY, DECEMBER 4, 1868.

## Announcements by the Council.

### ORDINARY MEETINGS.

Wednesday Evenings at eight o'clock :—

DECEMBER 9.—“On the Drying Properties of various kinds of House Paint.” By CHAS. TOMLINSON, Esq., F.R.S., F.C.S. On this evening Professor WM. ALLEN MILLER, F.R.S., will preside.

DECEMBER 16.—“On Artificial Freezing.” By Dr. B. H. PAUL.

DECEMBER 23.—“Description of the Electric Organ.” By HENRY BRYCESON, Esq.

### CANTOR LECTURES.

The first Course of Cantor Lectures for the ensuing Session will be “On the Aniline or Coal Tar Colours,” by W. H. PERKIN, Esq., F.R.S., and will consist of three Lectures, to be delivered on Monday evenings, as follows :—

#### LECTURE I.—MONDAY, DECEMBER 7TH.

*Coal Tar, Benzol, Nitrobenzol, Aniline, and Aniline Purple or Mauve.*

Coal-tar: its formation and constitution—Aniline a constituent of coal-tar—History of aniline—Discovery of aniline purple—Benzol: its properties, and separation from coal-tar—Nitrobenzol—Manufacture of nitrobenzol and aniline—Preparation of aniline purple, or mauve.

#### LECTURE II.—MONDAY, DECEMBER 14TH.

*Mauve, Magenta, and some of their Derivatives.*

Chemical nature of mauve—Runge's blue—Magenta: its discovery and manufacture—Phosphine—Bleu de Lyon—Bleu de Paris—Violet Imperial—Hofmann's violets—Britannia violets.

#### LECTURE III.—MONDAY, DECEMBER 21ST.

*Various Aniline, Phenol, and Naphthalin Colours—Application of the Coal Tar Colours to the Arts.*

Aldehyd green—Iodine green—Perkin's green—Aniline pink—Black, browns, &c.—Phenol—Picric and isopurpuric acids—Aurine, coralline, and azuline—Naphthalin yellow—Chloroxynaphthalic acid, &c.—Application of the coal-tar colours to the arts of dyeing and printing—Paper staining and colouring—Lithographic and other printing.—Conclusion.

Each lecture will begin at eight o'clock. These Lectures are open to Members, each of whom has the privilege of introducing two friends to each Lecture. Tickets for this purpose are forwarded with this week's *Journal*.

Other courses are being arranged, particulars of which will be announced.

### SUBSCRIPTIONS.

The Michaelmas subscriptions are due, and should be forwarded by cheque or Post-office

order, crossed “Coutts and Co.,” and made payable to Mr. Samuel Thomas Davenport, Financial Officer.

## Proceedings of the Society.

### FOOD COMMITTEE.

The Committee met, after the summer recess, on Wednesday, 11th November; present—Mr. Benj. Shaw (in the chair), Mr. Tufnell, Rev. J. E. Hall, Mr. G. F. Wilson, F.R.S., Mr. J. T. Ware, and Mr. E. Wilson.

Dr. ESTOR attended the Committee as the Inventor of a Process for the Preservation of Meat. Dr. PEARCE and SENOR MAXIMO TERRERO were also present.

Dr. ESTOR stated that the process he had adopted consisted simply in using two gases, *i.e.*, sulphurous acid and chlorine. These gases are not applied simultaneously but in succession. The apparatus for producing these gases may vary according to circumstances, provided this principle is maintained. For general purposes, and when comparatively small quantities of meat require to be treated, the most convenient form of applying these gases is that of a pastille, consisting of a clay bowl resembling that of a tobacco-pipe of large size, coated on the outside with sulphur, the interior of the bowl being filled with a paste containing chlorine. [Specimens of the pastilles above described were produced and inspected by the Committee.] The action is this—the sulphur of the pastille, being set fire to, burns, giving off sulphurous acid gas, and by the time the sulphur is nearly burnt out sufficient heat has been generated to cause the chlorine gas to be evolved, thus effecting the object of the inventor—the subjecting the meat to the influence of the two gases in succession. Dr. ESTOR went on to state that, when required for use, the following plan had been found most efficacious:—The joints or carcasses required to be treated are hung in a safe or other air-tight receptacle, lined with tiles or other non-absorbent substances. The gas evolved from the pastille is of greater specific gravity than the atmosphere, and descends, the pastille is therefore placed at the top of the safe, under a dome of glass or earthenware. A lighted match is applied to the bottom of the pastille; the door of the safe is closed immediately the pastille begins to burn, and the meat is left in that condition till required for use. It is better to keep the meat in the safe till it is to be used; but it may be taken out half-an-hour after burning the pastille, and hung in the open air, without fear of it suddenly going bad, even in the hottest weather. In cases where large quantities are required for preservation for a length of time, he had found from experience that with the gases he was able to keep meat in a perfectly good condition for eight weeks in the hot weather, which he said was the longest period to which his experiments extended. At the end of that time the meat was cut up and dressed in various ways for the table. There was not the slightest taint of decomposition, and the only difference between that and fresh butcher's meat was that the former was excessively tender eating. He had no experience as to the results of this process in the case of meat sent from a long distance in ships. When it is desirable to keep meat for a month, or two months, the fumigation should be repeated, but how often depends upon circumstances, such as the state of the weather, the nature of the meat, &c. The theory of his process was this:—When the pastille is burning, sulphurous acid gas is produced, of which a considerable portion is absorbed by the meat. As the bowl becomes hot, chlorine gas is given off from the interior. These gases, separately, have the power of decomposing water slowly, but in con-

junction with each other their action in this respect is very rapid, the sulphurous acid taking the oxygen, and the chlorine combining with the hydrogen. Thus the original gases disappear, and two new substances are formed, namely, sulphuric acid and hydrochloric acid. The two powerful gases having done their work, are transformed into two others, which are harmless, and, it may be said, wholesome. Sulphurous acid alone will preserve meat for a time, so will also chlorine, but the meat thus preserved is nauseous; whereas, when the gases are used conjointly, in the manner above-described, and in due proportions, no trace of either remains. It was, he said, beyond all doubt that the cause of destruction or putrefaction in meat was the existence of minute vegetable and animal organisms. It is a well-known fact, that sulphur exercises a greater power over vegetable matter than anything else. There are places in Spain where sulphur is burnt in large quantities, and there is no vegetation for miles round. On the other hand, chlorine has the power of destroying animal life. If the theory were correct that the destruction of meat is due to minute animal and vegetable organisms, he did not know anything better to be applied for its protection than these two gases. It has been proved that when meat is surrounded by a perfectly pure atmosphere it does not putrefy. The object, then, is to remove from the atmosphere the causes of putrefaction. Recent experiments show that in the atmosphere there exist minute forms of vegetable and animal life, capable of rapid propagation. Furthermore, these minute organisms have been discovered on the body and in the body of animals in abundance. If these fungi and animalculæ are the cause of decay in animal and vegetable substances, all we have to do is to destroy them; but the question is how shall we destroy or poison them without poisoning the meat or food on which they live, for that which is poison to animals and vegetables is also poison to us? Sulphurous acid, as before stated, destroys all vegetable substances; chlorine destroys animal life; but the meat treated with these gases conjointly suffers no change, for reasons already stated. It is not "preserved meat" in the ordinary acceptance of the term, but "protected" meat. If the animal were in perfect health, and were killed so skilfully as to cause the least possible pain, and dressed or cleaned immediately after death as quickly as possible, no water being used, the meat would keep longer, and with fewer fumigations. As these fumigations do not in the least degree injure the meat, it is better, when any uncertainty exists, to repeat the process every second or third day. The receptacle for the meat should not be opened for the addition of a fresh joint without burning a fresh pastille.

The CHAIRMAN having directed attention to Medlock and Bailey's system of preserving meat by steeping or dressing it with bisulphite of lime,

Dr. ESTOR remarked that he had no practical experience of that process, but he considered any contact of water with meat intended to be preserved was injurious, and water was an important element in Dr. Medlock's process, and he did not think it was efficacious for preserving meat for a long time. Chlorine has a powerful influence in absorbing all loose hydrogen compounds, which sulphurous acid has not.

[The experiment of burning a pastille in the presence of the committee was then made, in which the evolution of the two separate gases was distinctly observable.]

Mr. E. WILSON inquired the extent to which those gases penetrated into the meat?

Dr. ESTOR replied in the case of an aitch bone of beef weighing 13 lbs., which he kept for eight weeks, the gases had evidently penetrated to the bone, as was proved by the test paper. They went entirely through the meat; he could not say whether they had entered through the marrow. The action of sulphurous acid alone darkens the colour of the meat, which with butchers is a matter of importance, whereas chlorine

alone has a bleaching tendency, and makes the colour of the meat too light. By the use of both these gases in conjunction, the natural colour of the meat is preserved. The protection of meat in its natural state is an important element as regards the nutritive qualities of food. As far as his own experiments had gone, he believed that with the burning of one pastille and the safe kept closed, joints of meat would remain perfectly good for six or eight weeks. He expressed a strong desire that the experiment should be tried under the supervision of the Committee.

Mr. E. WILSON asked Dr. ESTOR whether he had made any calculation as to the expense of protecting meat in the way described, brought in large quantities from a long distance, and involving a lengthened sea passage?

Dr. ESTOR apprehended the expense of the process would be merely nominal. The way in which he would bring meat over—say from Holland—would be simply burning a few of the pastilles under the tarpaulin with which the meat was covered. From long distances the meat might be hung closely together in a portion of the ship prepared for the purpose, and he believed occasional fumigations during the voyage would preserve it, or it might be brought in cases kept from the air, and fumigated with the pastilles. Under such conditions he believed meat could be brought from foreign countries in a perfectly good state.

Mr. E. WILSON remarked that the great object which the Committee looked to was the importation of meat from abroad in large quantities, and he apprehended the packages would constitute an important item in the cost.

Dr. ESTOR thought suitable provision could be made on board ship for hanging the meat and protecting it by fumigation, and if one piece of meat went wrong, it could be at once removed, so as to prevent injury to the remainder; and space would be economised as much by hanging the meat as by packing it in cases. He did not think, under the circumstances described, the meat would be prejudicially affected by the heat of tropical climates, because the action of the gases was such as to preserve the meat from the attacks of vegetable and animal organisms, which were the great causes of putrefaction. He had been informed of instances in which the process had acted most beneficially in the protection of meat in butchers' shops during the hot weather of the last summer.

A conversation ensued relative to the Australian process of freezing meat, in which Dr. ESTOR concurred in the testimony already given before the Committee, that the prejudicial effect upon the meat so treated arose from the contact of moisture from the ice. He, however, considered that the meat was deprived of its flavour by the freezing, and very quickly deteriorated after it was thawed.

Dr. PEARCE, who had been present during the proceedings, expressed a favourable opinion of the theory stated by Dr. ESTOR on which the process is founded. He remarked that if the air in which the meat was kept were dry and free from the germs of fungi and animal organisms, temperature, he believed, had little or nothing to do with decomposition. He concurred in the opinion given with regard to the prejudicial effect of external moisture upon fresh meat; water had an extremely injurious effect upon meat intended to be kept for a length of time. The dead meat trade from Scotland had now assumed such dimensions that it was of the utmost importance that proper railway cars or waggons should be constructed specially for the conveyance of the meat from Scotland. The London and North-Western Company have had trains nightly—one from Aberdeen, which arrives about half-past one, and the other from the West of Scotland, which reaches London at about three o'clock. Those trains sometimes consist of as many as twenty-five trucks, each laden with meat for the London market. In the heat of last summer this transit had to be discontinued, as the meat became de-

composed before it reached London. It would be easy, he said, to have railway waggons so constructed that by the use of Dr. Estor's process, meat might be transported from Scotland in the hottest weather in a perfectly good condition.

Mr. E. WILSON remarked that the testimony of practical men had been given, that while it was necessary that air should be admitted to the meat in the transit, yet that the dust which was created by travelling at a high speed had an injurious effect upon the meat. The question was how far these gases would supersede air?

Dr. PEARCE suggested that the meat should be subjected to the fumigating process before being packed for conveyance. He added, that the moment vitality ceased in an animal, organic chemistry began to operate and develop the germs of future mischief in meat. As soon as the animal was slaughtered and dressed, if this process were brought to bear upon it, the danger was obviated of vegetable and animal organisms setting in in hot weather. For the last twenty-five years sulphur had been used for the cure of skin diseases and parasitical growths, which in a deranged state of health occur in youth as well as in advanced age. Dr. Pearce exhibited to the Committee a small vessel, of a cup form, composed of pure sulphur, in which form he employed that substance in the treatment of skin diseases, &c. A similar action took place with regard to dead meat. Sulphurous acid not only prevented the germination of deposits from the air, but prevented the development of deposits in the meat itself after death, which development takes place at a high temperature.

The CHAIRMAN inquired how it was that the sulphurous acid did not affect the meat prejudicially.

Dr. PEARCE replied, it would do so if the meat were saturated with the acid; but these organisms were destroyed by an amount of sulphurous acid which did not affect the meat itself.

In reply to further questions by the Committee,

Dr. ESTOR stated that his experiments in this direction extended over about twelve months. He was not prepared to state what were the effects of his process with regard to poultry, but he believed it would be as successful with that description of food as it had been with meat. In the latter case he said there was no trace of unpleasant flavour from the treatment. He thought in the case of poultry a modified treatment might be desirable.

A conversation then took place relative to the revival by Mr. Latham of the proposition to import live cattle to this country from South America, and other large cattle-producing countries. The plan proposed by Captain Atkin, and brought before the attention of the Committee by that gentleman last year for effecting that object, was also adverted to, when Senor Terrero, who had an extensive acquaintance with South America, stated that in his opinion all attempts to add to the food supplies of this country by the importation of live cattle from the sources mentioned would result in failure. The native cattle, in their wild state, were, he said, quite unfit for the purpose; and to depasture them, and bring them into a condition fit for export, would involve a cost which, with the expenses, and great risk of transport, would bring up the price of the animals to that at which they could now be obtained in this country. He had no hopes of any plan for the importation of live cattle to this country, on the extensive scale which was demanded, ever succeeding.

The CHAIRMAN said a letter on the subject had been received from Mr. Edward Hight, which he thought it would interest the Committee to have read.

The letter was as follows:—

Bankside, Spring-grove,  
Isleworth, October 3rd, 1868.

SIR,—I have examined the detail of Mr. Robert Atkin's project for the transport of live cattle from the river Plate to this country, as reported in the *Journal of*

*the Society of Arts* of the 3rd of January, 1868, which you were kind enough to submit to me for my remarks upon. It is proposed to have a vessel of 6,000 tons to carry 1,500 head of cattle on three decks, and to accomplish the passage in 21 days, at a cost of £80,000, which would in my opinion represent less than the half of what it would really be, for with the amount of power that is required (say 2,000 horse) to propel such a body at the high rate of speed necessary to accomplish a passage of 6,000 miles in 21 days, the engines alone would cost more than the £80,000, which has been assumed for the first cost of the whole ship. This requirement amounts to a mean speed of 12 knots per hour, to be kept up the whole time, 750 knots at least of which would have to be done in the teeth of the N.E. trade wind (dead ahead), and judging from the time that the river Plate mails are delivered, about thirty days, I do not think that the passage could be depended upon for occupying less than thirty days, the half of which would have to be made in the tropics, and would be very prejudicial to the condition of the cattle. I once took out valuable bulls between decks to Calcutta for the East India Company, in a ship of 1,000 tons, when great expense was incurred and nothing neglected to ensure their safe passage; each bull had a stall built and padded, with room to lie down, and a veterinary surgeon to accompany them, but notwithstanding all our care we lost nine out of nineteen that were shipped, and I have at times brought down oxen from the Cape to St. Helena, occupying time from ten to fifteen days, but only having six to twelve at a time on the upper deck, and fine weather all the way (with the exception of the ship rolling considerably at times), and where they have been well attended to, but I have never found them improve in condition; on the contrary, they have lost substance and often landed in a feeble condition. The proposal to sling them would, I think, be impracticable, looking at the number you would have to sling, and the difficulty that would be found in keeping the slings in the right position to be of any use to them. I believe that the practice would be more injurious than otherwise, causing an irritable uneasy feeling in the animal, which would cause the constant displacing of the slings, and be thus more dangerous to the life of the animals, in my opinion, than letting them take their chance without the slings. Viewing it as a paying commercial enterprise, I do not see the elements of success in it (even if it is practicable of accomplishment, which I very much doubt). I believe all the working expenses are put too low, nor is there any charge for management put down in the statement. Admitting the approximation in the price, feeding, and some of the other items, the comparison stands thus:—

STATEMENT.		£.
Cost of ship .....		80,000
Insurance, five per cent. ....		4,000
Depreciation on value, ten per cent. ....		8,000
Wages .....		6,000
Wages, £500 per month.		
Provisions, 20 men at 6s. each, fifty-two weeks..		1,872
Wear and tear, and other items .....		3,000
Coals, 12,000 tons per annum, at 12s. ....		7,200
Cattle, £2 per head; 6 trips, 1,500 each .....		18,000
Food, at £1 .....		9,000
		57,072
Receipts.		
9,000 cattle, at £10 .....	90,000	
Deduct 20 per cent. loss .....	18,000	
		72,000
Leaves profit .....		14,928

## MY OWN BELIEF.

	£.
Cost of hull .....	£84,000
Cost of engines .....	80,000
	<hr/> 164,000
Insurance, at five per cent. ....	8,200
Depreciation on value, at ten per cent. ....	16,000
Wages .....	6,000
Provisions, 20 men at 6s. each, 52 weeks .....	1,872
Wear and tear, and other items .....	3,000
Coals, 12,000 tons at 15s. ....	9,000
Cattle, £2 per head; 6 trips, 1,500 each .....	18,000
Food, £1 .....	9,000
	<hr/> 71,072
Receipts (as above) .....	72,000
	<hr/>
Profit .....	928
I am, &c.,	EDWARD HIGHT.
To Benjamin Shaw, Esq.	

Dr. PEARCE remarked that it was a frightfully cruel proposition. Any one who had seen cattle landed here from Hamburg would say it was better to import dead meat than live cattle. The great desideratum was to import dead meat, not "preserved" but "protected" from decomposition, and he was not aware of any process by which that would be so well effected as by that of Dr. Estor.

The Committee directed that some experiments should be made in this process, under the superintendence of Dr. Estor and the Secretary, and gave their thanks to Dr. Estor and Dr. Pearce for the information they had given.

## THIRD ORDINARY MEETING.

Wednesday, December 2nd, 1868; the Earl of CAITHNESS in the chair.

The following candidates were proposed for election as members of the Society:—

Crellin, Philip, jun., 87, Regent-street, W.  
Peters, Major James, Junior Carlton Club, S.W.

The following candidates were balloted for, and duly elected members in the Society:—

Arkwright, John H., Hampton-court, Leominster.  
Ashby, John, Staines, Middlesex.  
Aubert, William, 98, Strand, W.C.  
Baily, Farmer, Hall-place, Tunbridge.  
Botfield, W. B. Garnett, Windham Club, St. James's-square, S.W., and Decker Hill, Shiffnal.  
Briscoe, John Ivatt, Fox-hills, near Chertsey.  
Burr, Daniel Higford Davall, Aldermaston-court, Reading.  
Clarke, Henry, 6, Regent's-park-villas, N.W.  
Coleman, Alfred, 13, St. Mary-at-hill, E.C.  
Courthorpe, George C., Whiligh, Hurst-green, Sussex.  
Davidson, Ellis A., 29, Clarendon-gardens, Maida-hill, W.  
Davis, William, 208, Euston-road, N.W.  
Day, John B., Savoy Steam Press, 3, Savoy-street, Strand, W.C.  
Denison, Colonel Sir William, K.C.B., F.R.S., Observatory, East Sheen.  
Drummond, George James, 11, Wilton-crescent, S.W.  
Dunmore, Edward, 81, Malden-road, N.W.  
Ellis, Benjamin Trapp, 17, London-road, Croydon.  
Erle, Rt. Hon. Sir William, Bramshott-grange, Liphook, Hants, and 12, Princes-gardens, W.  
Ferne, Kirwin J., Chaise-lodge, Hendon, and Union Club, S.W.  
Fielder, C. H., 30, Moorgate-street, E.C.  
Frost, Meadows, St. John's-house, Chester.  
Gibson, William, Percy-villas, Maple-road, Penge.  
Harrison, Charles, J.P., Stourport, Worcestershire.

Hollis, Alfred Henry, 14, Highbury-place, N.  
Hopkinson, William Lander, M.D., St. Martin's, Stamford.  
Horner, Rev. John S. H., Mells Rectory, Frome.  
Jesse, John Fairfax, Llanbedr Hall, Ruthin, N. Wales.  
Johnston, Thomas, 12, Camden-place, Bath.  
Kearns, H. W., 4, Granville-terrace, Jeffries-road, Clapham, S.W.  
King-Harman, Hon. Laurence Harman, New Castle, Ballymahon, Ireland.  
Mast, Christian, Belgrave College, Pimlico, S.W.  
Murdoch, George B., 14, Walbrook, E.C.  
Neville, Ralph Henry Christopher, Walcot, Northampton, and 20, Jesus-lane, Cambridge.  
Oakes, Thomas Haden, Riddings, Alfreton.  
Pearce, Charles Thomas, M.D., 28 Maddox-street, W.  
Perkin, W. H., Seymour-villa, Sudbury, N.W.  
Peter, John Thomas Henry, Chyverton, near Truro.  
Rait, George, 238 Kingsland-road, N.E.  
Reeve, William, 40, Cambridge-terrace, W.  
Rodd, Francis, Trebartha-hall, Launceston, Cornwall.  
Rowley, Rev. W. W., M.A., Coombe-lodge, Weston-super-Mare.  
Simms, William Hawes, 21, Thurloe-place, S.W.  
Stephens, John, Leytonstone, Essex.  
Tayler, Henry Joseph, Collegiate School, Glastonbury.  
Taylor, James, J.P., Culverlands, near Reading.  
Thomas, W., Cwmaman Collieries, Aberdare.  
Wade, Thomas, Stonehouse, Plymouth.  
Weston, Rev. Henry Austin, Long Preston, Leeds.  
Windle, Hattam, 5, Princes-street, E.C.  
Wheatley, John Hewitt, Abbey-view, Sligo, Ireland.  
Wood, F. C., 483, Oxford-street, W.C.  
Woodd, Basil George, Hillfield, Hampstead, N.W.

The Paper read was—

## FURTHER NOTES ON THE INDUSTRIES AND PROSPECTS OF NATAL.

By DR. MANN, SUPERINTENDENT OF EDUCATION, AND SPECIAL COMMISSIONER OF THE COLONY.

On the 29th of January last, the author of this paper had occasion, and the pleasant opportunity, to bring before the Society of Arts some facts and considerations concerning the industries and commercial prospects of the young colony of Natal. The discussion which followed upon that occasion took so general and interesting a turn that it proved impracticable then to meet the many appeals which were made for extended information in the few brief minutes which were at command. The author accordingly postponed the chief part of what should have been then said, if there had been time, until a new session of the Society allowed more convenient and more adequate return to the subject, and now, at the opening of this new session, takes up the thread again, with the addition of some strands which have been furnished by the experience of the months that have passed since the last meeting. And in the first place a simple act of justice has to be done to an unfairly and undeservedly aspersed element, which goes very far indeed towards being the good guardian and beneficent sprite of this colony. A question was asked in the course of the discussion of last January, which seemed to imply that the water of Natal was not altogether as good as it should be. The implied charge of ill-repute was, in some measure, answered at the time by a very competent authority, a gentleman, namely, who was some years Colonial Secretary in Natal, Mr. W. C. Sargeaunt, who stated that it had been his fate, on more occasions than one, to get nothing else to drink for considerable periods at a time than the natural beverage of the running streams of the land, and that he had always found that beverage to be both eminently pleasant and salubrious. The simple fact is that the running water of Natal is scarcely rivalled, and certainly not excelled, by the waters of any country in the world. This is a natural consequence of three conditions which here com-

bine to bring about the most beneficent result, namely, the frequency and abundance of the rainfall, the steep and rapid inclination of the surface of the land which fills all the streams with never-failing sparkle and life, and the hard, clean material, chiefly granite sand-stone and trap, in which most of the water channels are carved. It is a direct result of these conditions that the water so bountifully scattered over the entire face of this South African land is literally distilled water. The photographer who travels through the wild districts of Natal can almost anywhere make his nitrate of silver baths and developing solutions, of water taken from the nearest stream, with as much safety and surety as he can with water distilled for his use by Mr. Rouch, of Norfolk-street, or any other chemist. After the first days of his own experience the author, at Maritzburg, fell back entirely upon water drawn from the open channels cut through the streets of the city by the old Dutch pioneers of the colony, as was their wont. The running water generally becomes turbid after heavy rains, but the turbidity is of a character which tends to the purification rather than noxious contamination of the liquid. It is almost entirely composed of aluminous matter held in mechanical suspension, which falls as a sediment directly the water is allowed to remain at rest, and in falling carries with it to the bottom all other accidental impurities existing in smaller quantities. There are, of course, low-lying situations in Natal, as there are everywhere, where, from want of natural out-fall the water stagnates, and becomes unwholesome and impure. The Port of Durban stands, unavoidably, upon a site of this character. It is built upon a flat of blown sand, raised only a few feet above the high-water level of the ocean, with three of its sides trenced upon by water, either fresh or salt. A considerable portion of it is impregnated by brackish infiltration from the water of the sea, or inner tidal bay. This, indeed, is the chief reason for the false impression that has got abroad concerning Natal water. People speak and write of their early and brief experiences while in the neighbourhood of the port, and their narrative is taken as applying to the land generally. But the truth is that these low-lying, badly-drained, and therefore naturally unsalubrious districts are of very much narrower extent, and of very much more rare occurrence than in most countries on the earth. Even the flat-lying port, to which illustrative allusion has been made, has two magnificent streams of purely crystal water, lying within easy reach, and only requiring a comparatively moderate outlay to bring them into every street and every house in the town in unrestricted abundance—a result which is most certainly destined to be enjoyed by the inhabitants of the sea-port town of Durban before long.

The abundance of rainfall and the absence of absolute drought, is, perhaps, one of the most remarkable features of this land. There are, as have been already stated, well marked wet seasons and dry seasons of the year. But in the dry seasons the rivers and streams never actually dry up, as they do in many parts of this hot African continent. In the course of a close and exact observation of the climate during a period of 96 months, there were only 31 months in which the rainfall did not amount to one inch. Of these dry months there were only thirteen in which the fall was under one-tenth of an inch. During only four months of the series, namely, once in May, once in July, and twice in June, there was no rain at all.

During this period of 96 months, the water which fell at Maritzburg, at a height of 2,095 feet above the sea, would have amounted to a depth of 20 feet and 2 inches if it had remained where it fell. Of this quantity 16 feet and 8 inches belonged properly to the six months of October, November, December, January, February, and March. Three feet and 2 inches belonged to the months of April, May, August, and September; and 4 inches belonged to the months of June and July.

It has been said that the water of Natal goes very far indeed towards being absolutely the good guardian and

beneficent sprite of the land. The one point in which it fails of being the good sprite entirely is, however, a quantitative and not a qualitative consideration. It never fails altogether. Even in the rare months of no rainfall, in consequence of the peculiar conformation of the physical relations of the land, dews and night mists settle upon the hills in sufficient force to make the running streams everlasting; but it does sometimes manifest a too generous bounty for a brief interval; an occasion of this kind has just occurred. On the evening of Friday, the 28th day of August last, rain began to fall on the coast district of Natal, and continued to do so until twelve at noon on the following Monday. Within those sixty-four hours the fall amounted to 16·54 inches; that is to say, in that short period it exceeded one-third of the mean annual rainfall of Maritzburg city, derived from a period of eight years' observation. The rivers of the coast rose rapidly into flood, and damage was effected within the three short days to public works, chiefly roads and bridges, which it is estimated it will cost £40,000 to repair. The most important portion of this is due to the sweeping away of one fine bridge which had been constructed over the lower part of the river Umgeni, to connect the port with the coast county of Victoria, in which the planting of sugar and coffee has received the largest development. This bridge was completed in the month of September, 1864, at a cost of £19,000. It consisted of iron girders, resting on cylindrical iron piers, which were screwed to pile beds driven twelve feet under the bed of the river, and was 900 feet long. The height of the girders above the river was pitched at an elevation, in excess of an excessive flood that occurred in April, 1856, and that was the only previous incident of the kind experienced within the historical period of the colony. On the occasion of this last great rainfall, however, the water of the river Umgeni rose so rapidly through the Saturday and Sunday, that at four o'clock on the afternoon of this day it was within two feet of the girders of the bridge. A little before this time a colonist named Fell, and twenty-two of his native servants, were on the bank of the river at this spot, when they saw the flood in the ordinary channel of the river sweeping down toward them like a wall. They were unable to escape the sudden rush of the stream, and only saved themselves by climbing into a large tree that was near them, from which perilous and precarious refuge they were at last rescued by a boat, and by an act of some courage and daring, after some hours of exposure. At seven o'clock in the evening the water was one foot above the girders of the bridge. At four o'clock on the Monday morning the current was running between ten and twelve knots, and where the bridge had been on the previous day there remained only two shattered girders and three isolated cylinders. The costly bridge was gone.

Six other bridges, besides this large and important one, were destroyed. These were all upon rivers towards the sea. One inexpensive timber bridge was swept away at the city of Maritzburg, which is about forty miles in a direct line from the sea; but all bridges further inland suffered only slight damage. The rainfall at Maritzburg was 12½ inches during the 64 hours, and the river Umsimduze there rose between 20 and 25 feet.

Only two floods of this destructive character have occurred in the colony of Natal within the period of civilised occupation, and therefore of historical record. The first was in 1856; the last in the present year (1868). An approach towards a similar occurrence was made in 1865, but the rainfall on the coast was then only 8·97 inches, not enough to cause anything beyond temporary inconvenience to travellers. It is, however, well worthy of remark, that all these three instances of excessive rainfall took place in the dry season of the year. The first was in the month of April, the second in the month of June, the third in the month of August. These are all

essentially and properly dry months. The explanation of this is very plain and obvious. These heavy rain-falls are simply caused by the movement of a large body of air fully saturated with moisture from the vast ocean space towards the south-east upon the land in a season when its temperature is at the lowest. If the same thing occurs at a season when the land temperature is comparatively high, the saturation point of the air is not lowered, and the deposition of the large load of water is not caused in the same rapid, energetic, and sustained way. In all these cases the great brunt of the rain-fall occurred upon the coast district, where the first contact of the water-laden air with the land was effected. The rain became less and less with advance inland, and the up-country rivers were scarcely swollen; this will always be the case with the Natal floods of this character. It is now obvious that at distant intervals extreme rain-fall, capable of flooding the lower portion of the river channels to an inconvenient extent, must be anticipated, and that bridges upon these rivers must be either of a more or less expensive nature to meet the contingency. Until bridges capable of bearing the strain of any flood can be constructed, cheap, although serviceable, timber that does not involve ruinous loss when swept away must be looked to. An estimate has already been made for immediately replacing the Umgeni bridge by a timber structure that will not cost more than £2,000, and that will be calculated to perform all essential duties for several years. It is perhaps worthy of note, that wherever these floods do most immediate damage to the crops, they leave a large measure of compensation behind them by manuring the flooded land with rich alluvial soil. It is, therefore, in the direction of the damage effected upon public works that their injurious influence is most permanently exerted. In the higher districts their baneful power tells chiefly upon the insufficiently protected live-stock of the farmers scattered over the hills. The woolled flocks are of course especially liable to suffer from the visitation, as the flock masters have not yet made any extensive or adequate provision for meeting such emergencies.

Up-country rivers are occasionally swollen into flood; but such floodings in those districts take place in the legitimately wet season after thunderstorms. They are much less extensive and violent than the coast deluges, but generally more sustained. The up-country rivers are usually impracticable for horsemen and ox-waggons at these open fords, or drifts, as they are locally termed, during several weeks of the summer season.

One of the most important considerations in connection with the destruction of this bridge over the Umgeni river is the fact that, if it had not been destroyed, there would have passed over it this season, for shipment at the port, five thousand five hundred tons of sugar, two hundred tons of coffee, and forty thousand muids, or sacks, of Indian corn, all produced by this one coast county of Victoria, to which the bridge was the immediate outlet. As a supplement to what was said and printed last year in regard to the productive industries of this young colony, I may now state that the general increase in the production of the land has been surprisingly and unprecedentedly large. The value of the exports of the colony of Natal for the first nine months of the year 1867 amounted to £168,701; their value for the first nine months of the year 1868 was £200,023, giving an increase for this period of nine months of £31,322. For the first time in these nine months the exports of the colony have very nearly approached the imports in value. The value of the exports for this period was £200,023, and the value of the imports £212,382; the excess of the value of imports over exports for the period being thus only £12,359. It is also worthy of note, as indicating at last some slight rallying from the severe blow of the commercial crisis and panic, that the value of imports in the first three months of 1868 was £8,838 larger than in the first nine months of 1867, although, from some unascertained and unexplained cause, certainly not very

intimately connected with any increased temperance of the community in the matter of strong drink, but much more probably depending upon some phase of the increase of internal production, the value of spirits imported in the nine months of 1868 was only £2,264, against £5,539 for the corresponding nine months of 1867.

In connection with, and in partial explanation of, this very gratifying and healthy sign of rapid increase of exportable produce and value, it may be said that the prospects of the season, irrespective of the influences of the one temporary drawback, the occurrence of the flood, for the three most important staples of the colony were eminently auspicious. The canes were reported to be everywhere in the finest possible condition. Three plantations near Durban, belonging to well-known planters, are spoken of as yielding this season 1,300 tons of sugar between them, the yield on two of the estates being estimated at three tons of sugar per acre. One of the estates is paying £16 per cent. for the year. The coffee crop is rapidly growing into notice and estimation. For the first time, I believe, twenty-five tons of coffee were tendered to a Durban merchant, who himself communicated the fact to the author, by one planter. The crop of the berry was promising well everywhere, and the estimate of produce of the plantations had been in every case exceeded, and in some cases doubled. One grower had had reason to complain that his store buildings had been broken down by the unexpected load he had been called upon to place in them. A sample of coffee sent home by Mr. H. Gillespie, a gentleman who spoke of Natal prospects in the room of the Society in the January meeting, was sold for 76 shillings the cwt., and the brokers who effected the sale stated that it would have commanded a higher price but for the fact that pea-berry and flat-berry coffee were injudiciously mixed together in the consignment. When this sale was made the best Ceylon plantation coffee was selling in the market at 80s. and 84s. per cwt. The Natal coffees are generally held by competent judges to resemble the finest samples of Indian produce. A specimen of Mr. Gillespie's consignment is placed before the meeting.

It will be remembered that in the January meeting Sir Charles Nicholson dwelt pointedly upon the fact that sheep do best in low, flat, dry plains, and that they are not suited to wet and mountainous countries; and from this drew the inference that sheep-farming can hardly be expected to be largely or very successfully prosecuted in Natal. A reference to the clause of the author's January paper relating to Natal sheep, printed on page 213 of Vol. 16, will show that in this remark Sir Charles was very much repeating what had already been advanced. The important part of that clause will be found to be to this effect:—"The inference is obvious, that sheep farming in Natal will ultimately consist of the rearing of comparatively small flocks in connection with the general tillage of the soil, as is done in England, rather than in the possession of unlimited flocks roaming wild over the prairie. There is now no doubt that, where this system is pursued, artificial food provided and due skill and care exercised in the selection of the farm, and in the management of the stock, sheep will prove a most marked and important element in the Natal settlers' prosperity." During the last year this view of the case has received some further remarkable illustration. One typical instance may be adduced:—An old colonist, connected with the Government Civil Service, who is farming within six miles of the capital, and who would have been present in the meeting of this evening but for the fact that he has been compelled to leave London to embark in the steam-ship "Asia," leaving Falmouth for Natal on the morrow, gives as his own personal experience with sheep in that locality, which is among the hills, but only 2,000 feet above the sea, the following statement:—"He bought 530 sheep in March, 1867; and his gains and increase up to the present time are—



	£	s.	d.
April, 1867.—320 lbs. of wool sold at 8½d. per lb. ....	11	0	0
December, 1867.—943 lbs. of wool at 1s. 1½d. per lb. ....	53	5	4
March, 1868.—490 lbs. of lambswool, at 10½d. per lb. ....	21	18	11
250 lbs. of wool tailings, at 3d. per lb. ..	3	2	6
74 hamels, worth 10s. each.....	37	0	0
150 lambs, worth 8s. each .....	60	0	0
	186	6	9

And the flock when he left the colony, some five months since, consisted of 697 sheep, and 150 lambs were then nearly due. This instance sufficiently justifies the well considered and guarded statement that under due skill and care sheep will prove an important element in the Natal settlers' prosperity. Sir Charles Nicholson dwelt upon the unquestionable fact that the 200,000 sheep of Natal are under the mark of a single Australian flock-master's share. This, however, is only one side of the argument, and goes to prove what no one questions, that Natal is not such a sheep land as Australia. Natal does not profess to be so. What Natal affirms is, that she can profitably add sheep, under a good system of management, to other industries, and that wool, and coffee, and sugar can be grown in Natal with advantage within fifty miles of each other, and within easy reach of the sea; and she then points to the fact that there are now over 200,000 sheep where twelve years ago the Dutch farmer believed sheep could not be reared or fed at all, because the country was "wet and mountainous" and approximately tropical. It is in this point of view that the 200,000 tells.

In January last, it was said that a gentleman, used to the management of the silkworm in China, had just left England for Natal, to give silk an experimental trial in the colony. This gentleman has taken up a tract of land within twenty miles of the port, at a rental of 2s. 6d. an acre, with right to purchase within five years at £1 an acre; and he writes to me under date of the 1st of September, 1868, that he is now only waiting a supply of good Japanese seed that he has made arrangements to get forwarded, and that he has laid himself out for the cultivation of silk, cochineal, coffee, and opium; and he adds that he is quite satisfied that any man who could join him with £700 or £800 could scarcely find a better investment.

Specimens of Natal coal were shown in the January meeting, and it was stated that there were large deposits of this mineral within 180 miles of the Port; that the exact geological character of the deposit had not been determined; and also that no sufficient trial of its quality for raising steam for driving machinery had been made. The author is now able to furnish further evidence on the two practical points. Specimens of organic remains associated with the coal deposit from one spot within 60 miles of the capital, namely, the Channel of the Bushman's River, sent to him by Dr. Sutherland, the Surveyor-General of the colony, are now before the Society. These specimens have been carefully examined, with the author, by Mr. Robert Etheridge, the well-known and highly-qualified palæontologist of the School of Mines, in Jermyn-street, and there is no doubt that these specimens consist mainly of impressions of a *Glossopteris*, in all probability *Glossopteris Browniana*; and that there are traces among the *Glossopteris* impressions of fronds of a *Dietyopteris*, and of seed cases and stems of a *Phyllothea*; all of these being forms of organisation of Mesozoic rather than of Palæozoic age. The Natal coal of this particular locality is certainly either jurassic or cretaceous. But the consideration, of course, yet remains whether all the coal in Natal is of one age and geological character.

In regard to the question of mechanical usefulness and commercial value, a very important and altogether reliable trial has now been made, and the result of this

most interesting experiment has been officially and authoritatively communicated to the author by the Honourable the Colonial Secretary of Natal. Seven tons of the upland coal, identical with the specimens which were exhibited to the Society of Arts in the beginning of the year, were put on board Her Majesty's surveying ship *Hydra*, and carefully tested by Mr. Lodge, the engineer, in comparison with an average sample of north country English coal, and a best-quality sample of Welsh coal. Captain Shortland, of the *Hydra*, reported the result of the trial from Algoa Bay, on the 2nd of June, 1868, and the tenor of his report was to this effect:—

In regard to the number of minutes and quantity of coal required to get up steam with the various samples, the result was:—

Cardiff coal—Steam up in 60 min., with consumption of 26 cwt.

West Hartley coal—Steam up in 50 min., with consumption of 32 cwt.

Natal coal—Steam up in 55 min., with consumption of 30 cwt.

The Natal coal got the steam up more quickly than the Welsh coal, but the consumption was larger. It got steam up less quickly than the Hartley coal, but with slightly less consumption.

In steaming on the third grade, with the same amount of water raised into steam, the consumption of coal per hour for the various samples was:—

	lbs.
Cardiff coal.....	1,553
West Hartley coal .....	1,648
Natal coal .....	1,568

In steaming on the second grade, with the same amount of water raised into steam, the consumption of coal per hour was:—

	lbs.
Cardiff coal .....	1,624
West Hartley coal .....	2,293
Natal coal .....	2,128

The several samples yielded of ashes:—

	per cent.
Cardiff coal .....	9
West Hartley coal .....	8
Natal coal .....	16

They yielded of clinker:—

	per cent.
Cardiff coal .....	2
West Hartley coal .....	5
Natal coal .....	7

The Cardiff coal yielded very little smoke of a light-brown colour. The West Hartley coal yielded a large quantity of black smoke. The Natal coal yielded a moderate amount of light-brown smoke. Upon the whole, Mr. Lodge considered that for easy steaming the Natal coal was very nearly equal in value to the Cardiff coal; that when as much steam as can be generated is required, a larger quantity of Natal coal than of Cardiff coal is required, in consequence of the greater abundance of earthy matter contained in it deadening the fires, and making it impracticable to keep up the full supply without constant use of picker and rake; and that if samples of Natal coal could be found with somewhat smaller proportions of earthy matter than the specimen used in the trial contained, the mineral would be fully equal, for all purposes, to the best qualities of Welsh coal.

It will be remarked that this actual trial of Natal coal fully bears out the presumption established by the examination of the organic impressions from Bushman's river. The main characteristic of the Secondary, or Mesozoic coal, as contrasted with the older Palæozoic coal, is the greater abundance of water and earthy ingredient combined structurally with the combustible elements, carbon and hydrogen. No absolute progress has been yet made in resolving the question how this



valuable coal deposit is to be turned to practical account; how the mineral is to be got down to the port for shipment in large quantity, at reasonable and available cost. The consideration of the possibility of constructing a main line of railway that would answer this purpose has been before the Legislative Council in its recent session; but the time when the public revenue is still suffering severely from the commercial crisis is, unfortunately, one in which the difficulty of construction, as well as the need, is, for the period, increased. A survey has, however, been run from the port through the capital and the coal district up to the northern frontier of the colony, and evidence of all kind has been taken before the House. I believe the entire rise of the gradient up to the coal district, allowing for the frequent undulations of the country which has to be passed, has been estimated at seven thousand feet in a length of 180 miles, or thereabout. It is considered quite practicable to construct a line for slow rates of speed; and for a single line, with three feet six inch gauge, and metal stout enough to bear heavy traffic, at twelve miles an hour speed. Two several estimates have been furnished by practical men who have examined the country; the one estimate being for about £3,000 a mile, and the other estimate about £5,000 a mile. In the meeting of January last Sir Charles Nicholson drew attention to the fact that the feeling in British colonies is for, and the experience against, too early railway enterprise; and especially instanced, in warning, the case of colonial governments which had expended three and four millions of money, and encumbered themselves with a debt which it would take years to pay off. There is no doubt whatever that it would be the easiest thing in the world for Natal to do the same thing. But, on the other hand, it is not perhaps altogether clear that Natal may not use the warning in a different sense to that in which it was given. At any rate the author, after still further consideration of this most important subject, continues to believe that it may be so. The true principle, he submits, has been most admirably laid down in connection with Indian affairs. Railways tend everywhere to the development of popular enterprise and wealth, and it is the duty of the government of a young land to use its utmost influence to bring this very energetic engine of amelioration and civilization into play as soon as it can. Of course, it may make the attempt to perform this duty clumsily, inefficiently, and injuriously. The task is one which calls for great prudence, circumspection, and sagacity. But the principle which ought to govern its action is a very clear and plain one. It is simply that a government guarantee for the construction of a railway may always be given with propriety when the increase of prosperity worked by the railway is sufficient to afford such a return through public taxes, as covers the difference between the actual gains of the railway and the amount of the government guarantee. The mere question of whether a railway will pay in the ordinary business sense of the term may not be the most important consideration where the opening out of increased facilities for communication is also a matter of primary and immediate moment to a young and struggling community. A writer in the *Times* recently, very strikingly and truly said that so long as sheer hard labour of man or beast slowly bear through dust and mire whatever has to change its place, a country, as regards its comparison with more advanced and fortunate lands, is like primeval man armed with lances and bows matched against the cannons and rifles of modern Europe. The writer's impression unquestionably is, that with the earliest return of prosperity to the colony of Natal it will be found practicable for the colonial government successfully to perform this duty of developing the means of easy internal communication upon a scale which will fulfil the fundamental principle here enunciated, will supply all that is actually necessary for cheap, easy, and constant transport, and yet not cripple the community with an intolerable burthen. It should

never be overlooked that Natal stands in a very peculiar condition, and that while the general position of the influence of a railway upon enterprise and prosperity applies to this colony as to all other lands, there are three especial reasons why the railway is paramourly demanded here. 1. There are large deposits of valuable coal that are entirely useless until the railway has provided means for the transport of the "black diamond." 2. The produce of a large tract of the interior has to be drawn down to Natal by the facile character and recommendations of this outlet. 3. A railway will at once throw open the broad lands of the colony, at present almost locked up from industrial enterprise, to settlement; and carry the market for produce to the doors of those who now scarcely trouble themselves to produce, because when they have produced they do not know what to do with their productions. The author entirely agrees with Sir Charles Nicholson that Natal had far better wait for its railway if it be true that it can only have the boon by contracting debts of millions of pounds sterling; but if this be not true, and if it be possible to construct in this colony a railway of single line and narrow gauge, to work at slow speed, for moderate outlay—even, it may be said, at the cost of £5,000 per mile—the sooner the beneficent work is commenced the better for all concerned. Both the construction and the working must, of course, be carried out under most careful and rigid economy. In the first instance, it must be so planned as to satisfy certain primary and essential requirements. It must gather the produce of the most developed settlements; it must connect the capital with the port; it must penetrate the coal-fields; it must bring the inland frontier into communication with the sea; and it must carry new settlers to as yet unoccupied territory. Such is the problem. To this problem it may not be possible to furnish an immediate solution, but if some of the signs that are now rising on the colonial horizon are not false tokens, the solution will be found ere long.

There was one other remark made by the chairman of the January meeting of the gravest importance, and which deserves, not only to be reproduced upon this occasion as a theme for a passing comment, but also to be reproduced continually, and kept ever in prominent view. Sir Charles said his attention was never drawn to the great colonial dependencies of England without his having also aroused the feeling of deep anxiety and regret that the capabilities of these magnificent regions were not more generally known and appreciated in the parent country, seeing that there was in them every material for furnishing happy homes, prosperous lives, and the means of subsistence for countless numbers of our fellow-creatures, who are struggling with want, and pining with discontent in the over-crowded land of their birth. But Sir Charles added that, with all the colonies, there is but one way to enable themselves to become what in this particular they are so obviously intended by nature to be, namely, the organisation of a good system for the ready and easy acquisition of land. This incontrovertible and most pertinent remark was made in allusion to a statement which appears at page 215, vol. xvi. of the Society's *Journal*, "that after a considerable period of entire arrest of all facilities for the acquisition of land in its territory otherwise than by purchase, at artificially fixed prices, the colonial Government had just matured a scheme for granting assisted passages and allotments of Crown land to men who had the double qualification of special training and fitness for agricultural pursuits, and some small means to start with in their work of cultivation and stock-rearing. This system has been so far successful, that although the principle has been rigidly adhered to of endeavouring to select and introduce men who are fairly likely to find prosperity in a land which has a considerable abundance of cheap native labour, and which, therefore, furnishes for the present a very limited sphere of employment to white men, who have to look to wages for their daily bread, and therefore of entirely excluding the classes who alone are

always ready to furnish recruits for emigration, 182 grants of Crown land have been made within a period of eighteen months, comprising in all an area of about 19,000 acres, and 21,000 acres of commonage, supplemented by 33,000 acres of contiguous land, reserved for easy purchase by the settlers within five years. This organisation continues to be in force in the main, and gives ample promise of continued vitality and usefulness, although there has not, of course, yet been opportunity to test the results by the only rule that is of any final and ultimate value, namely, the fortunes and positions of the settlers. But, unfortunately, one correlative and practically important feature of the scheme has had to be for a time so far reduced as to be almost placed in abeyance, in consequence of the temporary limitation of the public revenue, and the present need for the observation of most rigid and scrupulous economy in public expenditure; this is the granting of money-assistance towards defraying the passages of settlers.

During the past eighteen months as much as £2,860 has been expended by the colony in this way, besides various minor charges that have been met to give other incidental help. For the next year the assistance will only be able to be given to a very limited number of applicants, but the land grants will still be made in favour of settlers who are able to defray the cost of their own passages; and with the return of the revenue of the colony to its more normal condition of prosperity and progressive increase, the more liberal proceeding will, in all probability, be renewed.

In the January meeting the chairman remarked, in allusion to this topic, that the administrations of Canada and the American and Australian colonies were competing with each other in furnishing land on the best and cheapest terms. It is, however, worthy of note that there are certain most emphatic figures on record that show that the brunt of this competition issues neither from Canada nor from the American or Australian colonies. In the last year, of 200,000 emigrants who left the British Isles to seek in other fields "happy homes, prosperous lives, and enlarged means of subsistence," 160,000 went not to Canada, nor American or Australian colonies, but to the Western states of the great Transatlantic republic. The reasons for this result will of necessity have to be very carefully scrutinised and weighed wherever the organisation of a successful, as well as of a good and easy system for the acquisition of land is contemplated. Among the reasons will be found the fact that the voyage and journey to these Western states are short and cheap; that there are railways penetrating quite into their recesses; that there are abundant markets everywhere in consequence of the stream of new population that is already established, and that is, therefore, carrying with it the wants and the increased demands for employment that are incident to such a flow. To this must also be added the consideration that in these Western states, namely, in the districts of Nebraska, Illinois, Wisconsin, and Iowa, an alien who will naturalise himself as a citizen of the United States by a declaration, and the payment of a fee of 14 dollars (about £3) may claim a free grant of 160 acres of open agricultural land, with the addition of 50 other acres for every child, male or female, and may purchase a further tract of 360 acres at a dollar and a quarter (about five shillings) per acre.

For various reasons it is exceedingly difficult for lands circumstanced like Natal to compete successfully with lands that have practically boundless territory, still to give away, as is the case with the United States of America, in establishing a successful and healthy immigration of men who have the right qualifications. At the present time the colony of Natal has not much above four millions of acres of Crown land remaining in the hands of the government, and of these some considerable portion is of course unavailable for cultivation, or the formation of small homesteads, from physical reasons, and other portions are quite on the confines of the

colony, the more central parts of the land having naturally been first taken up by private proprietors. As, however, much that has been so taken up is necessarily still unoccupied and unused in any industrial sense in a land where the population of a third-rate English town, namely, 17,000 people, hold and are presumed to fill the remaining seven million acres, it becomes a matter of the utmost moment to the present prosperity of the colony that some fair and just means should be found, if possible, to determine gradually the occupation of these wastes. There are various questions and considerations involved in the existing position of this matter that renders the affair as a whole both delicate and perplexing. The old government expedient of imposing a non-occupation tax upon all farms not industrially occupied has not succeeded in bringing this land into cultivation and use. Some of the most liberal and public-spirited proprietors have recently been granting small holdings on their estates upon easy terms of deferred payments; and at the present time the Natal Land and Colonization Company has stepped in to supplement the government action, where the government has for a time broken down, being actuated by the impression that any arrest of the movement of settlers towards the colony, which has now been fairly started, would be a disaster to be deprecated and rued by all classes of the colonial community, and by none more than by large holders of waste land, who look to realise within a reasonable period the money advances they have made in the acquisition of their property. This company owns a very large and very varied tract of land scattered throughout the colony, from the sea to the inland frontier; and it has now determined to supplement the retarded action of the Government by granting freehold allotments of portions of this territory, of 100 acres in extent, to suitable men, of a similar class to those which have been hitherto selected for the land grants of the Government, and to facilitate the transport of these men to, and their settlement upon, their grants, by securing them free passages to the colony, and reception, conveyance, and hutting there upon payment of ten pounds at once, and upon repayment, within a period of twelve or fifteen months, of such further sum as shall have been actually expended in their behalf and for their advantage. This is a very interesting experiment in the direction of that "organization of a good system for the acquisition of colonial land," alluded to by Sir Charles Nicholson as the indispensable condition of successful and healthy immigration. It will, however, require that it shall really be a matter of organization; and that all the details of the movement shall be thoughtfully, considerably, and judiciously carried out; but it certainly is not impossible that the "organization" may be so far perfected and established as to secure both the present advantage of the recipients of the land grants, and the ultimate advantage of the donors. The primary and essential condition of success in such organization is, that men of good special qualifications, but small means, shall be placed in a position where they can certainly extract from their own land returns that will enable them easily to repay the value of the advances that have been made to secure them this advantage, and shall be shown how to set to work to accomplish this first step towards prosperity and independence in the previously untried field. There must also be facilities for the acquisition of extension of their free grants and holdings upon assured and easy terms, as they realise the first fruits of their independence and industry. The freehold grant is simply the foothold of the invader of the new soil, whence he has to plan and conduct his further operations—the fulcrum of the lever by which the new fortunes are to be raised. One most important attribute of the action of this experiment is, that if it does succeed there is no practical limit to the extent to which the operations may be carried. More and more land, now lying hungry and waste, and therefore being now without absolute value, will be taken up from private

proprietors, and placed in the hands of thrifty and industrious settlers.

The limited time at command in a meeting of this character does not permit more than one other theme to be touched upon on this occasion. But that theme is one which can on no account be passed silently just at this period, when the fortunes and prospects of Natal are under discussion. As recently as the 27th of July, 1866, a young German explorer, Carl Mauch, who is bent upon traversing the entire length of the African Continent from south to north, when making an excursion with an old elephant hunter into the high region between the Limpopo and Zambesi rivers, came suddenly upon a spot where there was the clearest indication of gold-bearing quartz in considerable quantity, and where there were numerous artificially made pits, which had obviously been used in some remote period for some rude mining purpose. The rivers Limpopo and Zambesi lie, in this part of their course, respectively upon the 23rd and 16th parallels of south latitude, and, therefore, include a stretch of some 250 miles of country between them. A considerable portion of this district is composed of an elevated table of granite, crossed over with the small rounded eminences which are characteristic of this formation, and intersected with veins of quartz, most certainly auriferous in various portions. Carl Mauch states that he found indications of gold through a line that extends 200 miles from south to north, and that he has no doubt whatever, from the general aspect of the country, that identically the same physical conditions extend far towards the east and the west. Two distinct centres are especially specified as being peculiarly rich in promise—the one near the chief Mosilikatze's principal place on the Umkose river, and at Kumato, on the 19th parallel of south latitude; and the second sixty-five miles further to the north-east, on the rivers Sekwechene, Sepakwe, Umzwerwe and Umfuli, near the 18th parallel of south latitude. The southernmost of these fields lies upon streams which flow southwards into the Limpopo, and is about upon the same meridian of longitude as the mouth of the Kei river, but fourteen degrees of latitude further north. The northernmost field is on the same meridian as the capital of Natal, and twelve degrees of latitude to the north of it.

Of course, public attention has been very generally attracted to this discovery of Carl Mauch's. He has himself been down into Natal, and given to the authorities there a circumstantial account of his expedition; and various hungry and longing adventurers, drawn by the *sacra fames*, have been already tracking his footsteps. Upon the whole, all the incidental information that has been further gleaned has been confirmatory of Herr Mauch's views and statements. One party, which did not succeed in reaching actually to the first gold tract of Carl Mauch, nevertheless brought back to the Transvaal about one ounce and a half of gold dust, and six hundred weight of auriferous quartz, yielding at the rate of eight ounces per ton. During seven weeks' operations upon the river Tatin this party turned up twenty-five tons of similar quartz, which they estimated would give gold worth at least £1,000.

But the most remarkable part of the matter still remains to be told. This gold region of the Limpopo and Zambesi is in reality no new discovery. In 1858, Mr. T. Baines, when at Tete, on the Zambesi, with Dr. Livingstone, saw six bars of pure gold, six inches long and half-an-inch thick, which had been procured from the Luenza and other tributaries of the Zambesi. At this time Senhor Pito, of that place, had several native goldsmiths at work for him. In an old book, which has recently been brought under my notice by a friend, and which is entitled "A Geographical Historie of Africa, written in Arabick and Italian, by John Leo, a Moor, borne in Granada and brought up in Barbarie," printed in the year 1600, by George Bishop, of London—there occurs the following passage:—"Throughout all this Emperor's (Monomotapa) dominions is found infinite quantitie of

gold, in the earth, in the rocks, and in the rivers. The gold mines of this country nearest unto Sofala, are those of Manica, upon a 'plaine environed with mountains; and those also in the province of Mafuca, which is inhabited by the people called Battonghi, and situate between the equinoctial line and Tropique of Capricorne. These mines are distant from Sofala between the space of 300 and 600 miles; but those of the provinces of the Boro and Quitieni are fifteen hundred miles distant towards the west; so that from hence, or from Sofala, or from some other part of Monomotapa, some are of opinion that Solomon's gold for the adorning of the temple at Jerusalem was brought by sea." In 1861 Dr. Beke drew the attention of the meeting of the British Association for the Advancement of Science, to the reasons for concluding that the entire eastern side of the basin of the Nile is auriferous, and that the gold of Ophir was obtained from this source, although Ophir itself was in Arabia. Dr. Beke holds the very rational and probable opinion that the gold of Ophir, Havilah, and Sheba, was brought to those maritime districts of Arabia by the south-west monsoon, in the ships of "Tarshish," which went, as native vessels trading between the head of the Red Sea and the Persian Gulf still do, in one year, and returned in the next, and so employed "three years" about the voyage. Dr. Beke now believes that the whole of the east coast of Africa, from the all-golden Berenice (Berenice Panchrysos) of the Greeks in the north, to the gold coast (Sofalah-Edh-Dhabab) of the Arabians in the south, is auriferous, and that Herr Mauch's discoveries are the southernmost extreme of this golden region.

At any rate, there can now be no doubt that in the high inland region of South Africa, lying a few hundred miles directly to the north of Natal, there is gold. The only question that now has to be decided in regard to this precious deposit, is whether it exists there in sufficient quantity and under circumstances which will allow the mines to be profitably worked. It is a matter of direct consequence to Natal that this question should be answered as speedily and as fully as possible, because, if the answer is in the affirmative, the other pressing matters, such as immigration, and the settlement of the land, the railways and the coal mines, will certainly arrange themselves without further special interference. In order that the answer may be as full and as complete as possible, a small company of men, principally interested in the fortunes of Natal, has been formed to send out a small but well-equipped exploring expedition, which will sail from Falmouth in the steamship *Asia*, on the morrow of the day on which this paper is read. The geographical leader and explorer of the expedition is Mr. Thomas Baines, who has already crossed the entire breadth of the African continent in these parallels of latitude, with the exception of the small gap which he is now about to fill. The mineralogist of the expedition is Mr. Nelson, a Swede, who has been eleven years in California, and is a thoroughly expert assayer. The expedition has been very carefully equipped with instruments and appliances of every kind, and has been instructed primarily to determine the fact whether there is any gold region in this locality which can be made the seat of large operations, and secondarily, to extend the geographical and mineralogical examination of this most interesting region as far as may be compatible with the efficient attainment of the primary object. It is hoped that at no distant time the facts ascertained by this expedition will be in the hands of the public. In all probability its proceedings will become the subject of some future communication to the Society of Arts.

The only "last word" that can be added to this communication relates to the character of the route to these gold fields. This is naturally a matter in which some difference of opinion and of view is entertained, and every man who has a door in this direction of course hopes that his own threshold may be worn by the feet

of the gold-seeking and gold-laden pilgrims. As others have said, and will say, all that can be advanced for the routes by Cape Town, for Algoa Bay, for East London, and for the Zambesi, the author will confine his own remarks to the route which brings the subject properly within the scope of the communication now on hand, namely, the "Industries and Prospects of Natal;" and in doing this he will simply produce the evidence of an eye-witness, whose veracity and intelligence are known to him. The following passage is an extract from a letter addressed to the author, within the last four months, by Mr. A. K. Murray, an old and well-known resident in Natal. Mr. Murray writes "When I got to Grahams-town and Port Elizabeth, through Potchefstroom, Kronstadt, Bloemfontein, Colesberg, and Bedford, I found great excitement about the gold-fields, and was quite run after for news, and for an expression of opinion about the routes of access. From my experience now, and about five years ago, when I went north in the Transvaal, as far as Zontpannberg, near the Limpopo, I am bound to say that the route by Natal, Harrysmith (in the Free State), and Potchefstroom (in the Transvaal), is by far the shortest, easiest, cheapest, and best way, for many reasons, amongst which must be named, that at Natal there is now a good harbour, and that the main road from the port Overberg is all a good Government-made road; that all the principal rivers (except the Tugela, and that has an iron punt) are crossed by substantial bridges. The formerly difficult pass across the Drakenberg is now an easy-made road, over which I have myself taken many loads of merchandise, one weighing not less than eight thousand pounds, with fourteen oxen. I have had merchandise conveyed from the port of Durban to Pretoria by this route for twelve and fifteen shillings the cwt. When once over the Berg, and in the Orange River Free State, the country to Potchefstroom is flat, level, and easy, with good grass and water all the way, and in the Free State with plenty of game. In July last year I made a run down to Natal from Pretoria with a loaded waggon in twelve days. Sixteen and eighteen days is the usual time for the distance. Mr. Marras lately drove up in a light cart and two horses in six days. Potchefstroom, the principal town in the Transvaal, and the natural point of departure and supply for the gold region, is about 350 miles from Natal, 660 miles from Capetown, and 540 miles from Port Elizabeth. In passing the great Orange River, there bounding the Free State and Cape Colony, I had to pay threepence per head for my cattle being allowed to wade through at the drift, and five shillings for each waggon that was dragged through. All through this part of the Free State, and the upper part of the Cape Colony, not a blade of grass was to be found. I had to buy oat forage for the animals to keep them alive. I found the first available grass within 150 miles of Capetown. I encountered also plenty of tolls (of which there is not one in Natal) all the way along, and often had to pay high for a drink of water for my oxen at the farmers' large dams. On the Cape route oxen too were expensive and the wages of drivers and foreloopers were two or three times higher than in Natal."

Carl Mauch's report of the distance to the gold-field from the Megaliesberg, close to Pretoria, named by Mr. Murray as being from twelve to eighteen days from the Natal harbour, was 224 hours of actual travel by the ox waggon. The time occupied was 96 hours of travel to Sechomo's kraal, near to the great eastward head of the Limpopo, and 126 hours thence to Mosilikatze's kraal, which is just over the highest point of the water-shed between the Limpopo and Zambesi, on the Zambesi side.

#### DISCUSSION.

Mr. Gooch said he had only just returned from Natal, where he had been spending some time in observing the

condition and prospects of the colony. With regard to the question of water supply, he believed the only place where the water was at all bad, was where it lay in the flat lands, and there the sinking of tube or other wells of sufficient depth would overcome any difficulty. The running water in the upper districts was, according to his experience, exceedingly good. He had a special interest in the question of coffee cultivation, and, as far as he could judge, if it did not promise to be extravagantly lucrative there was every prospect of a very good return for the capital required, which would be from £4,000 to £5,000, and there were many circumstances connected with this pursuit which might render it attractive, even apart from purely business considerations. The sum of money he had named would of course be invested over a period of years, and at the end of six or seven he believed there would be a return of something like twenty per cent. There seemed few difficulties in the way of this branch of agriculture, the only one that occurred to him being whether the seasons were sufficiently regular to ensure a fair annual crop. No doubt last season's crop was very good, but he did not know whether experience had yet been sufficiently extensive to enable cultivators to depend on such a result pretty uniformly. The Natal coal was undoubtedly good, although it differed somewhat in character from English coal. As they had heard, it seemed to belong rather to the Mesozoic than the Palæozoic age, and the prevailing type of fern was *Glossopteris*. At any rate, the coal deposits appeared fully worth investigating and working. The question of railways was no doubt of prime importance, but there were certainly great difficulties in the way. In the first place, the climate was quite tropical in its character, which would be an obstacle in the way of English workmen, and there were also the great and sudden alternations of temperature. Again, the presence of the white ant would necessitate the construction of the line entirely of metal, and, as there was very little alluvial deposit, the greater portion of the work would be in rock; the curves also would be sudden, and the gradients heavy, there being a rise of 7,000 feet in the 180 miles, for which a line had been projected, to the coal-fields. There was also a deficiency of lime, which would be a great drawback to the construction of masonry; and there would be a difficulty in obtaining ballast. Undoubtedly, a railway would be of immense benefit to the colony, which was broken up into districts, and he believed the returns would be so large as to fully warrant the government in undertaking the construction, as, of course, those portions most likely to be remunerative could be made first.

Mr. HARTLEY had had great pleasure in listening to the able paper which had been read, and, after an experience of nineteen years, could endorse almost all that had been said. He would, therefore, refer rather to certain points not touched upon by Dr. Mann. Natal was a most difficult country to speak about; it was always making a noise in the world, and yet had produced but very poor results, and this all who had been connected with it knew to their cost. This statement, of course, required some explanation. The birth of Natal might be said to date from 1850, and from that time, until 1860, very little was done beyond scratching up the soil in a few places in a most unbusinesslike way, and producing a few samples which were laid before the world as specimens of what could be produced. Almost all those who went out at first were shopkeepers, who all tried to live upon one another, and the consequence was that, in a few years, a vast number of them had to pay their creditors in England with a few shillings in the pound. These difficulties, however, were just what the country wanted, in order to teach it how they were to be avoided in the future. Hence, about 1860, men began moving from the towns in all directions, and trying to cultivate the land, because they found it was absolutely necessary for them to

do so if they were to live at all. During the first eight years of his (Mr. Hartley's) residence there, nearly all the necessaries for the table were imported, even to potatoes, although there was no country in the world where they could be produced more cheaply. When this first impulse was given to agriculture by necessity, vegetables and grain were produced in such abundance that there was no market, and distress consequently ensued from that cause, which led the colonists to turn their attention to such crops as sugar and coffee, and to the growth of wool. In 1864, besides supplying its own wants, the colony exported wool, sugar, ivory, a little cotton, and a small quantity of coffee, in all to the value of £165,000. The imports for the same year were about £450,000, thus leaving a very heavy balance against the colony. The next year not much progress was made, the exports being £164,000; in 1866 they were £163,000; but in 1867 they were £178,000, and in the first half of 1868 they were £138,000, or equal to £276,000 for the year. The imports of wines, spirits, bread stuffs, tobacco, and oilman's stores were in 1864, £165,000; in 1866, £80,000; in 1867, 60,000; and in the first half of 1868, £25,000; thus proving in the first place that the colony was actually beginning to supply itself with these things; and secondly, that the great commercial crisis had made it somewhat more economical in the matter of luxuries. On the present year there would be a balance of exports against imports of about £40,000 in favour of the colony, and this was the first time such a thing had been recorded of any South African colony. This did not result so much from the wonderfully productive nature of the colony, as from the difficulties of the colonists having driven them to produce something which would not only supply them with the necessities of life, but also with the means of paying their debts. They were only just discovering what they could do, and this year the exports of sugar, including what came to England and what went into the Free State, would be worth about £130,000. It was proved to demonstration that sugar could be produced at the rate of two tons per acre on an average throughout the colony, from land which could be purchased for 20s. an acre, which was quite sufficient to show that it would pay to invest money in its cultivation. He was himself largely interested in the cultivation of coffee. The last speaker had stated the amount of capital required at £4,000, but he had planted 100 acres at a cost of £2,000, and 50 acres of it yielded at least 40 tons per annum. Sales of that very coffee had been made in Mincing-lane at 78s. per cwt., and the last parcel realised 85s., or £85 per ton; and he had now a parcel of eight tons lying there, which was held for 85s. This was pretty plain proof that the cultivation of coffee would be remunerative. Arrowroot used to be the great support of the poor colonists in Natal, but had failed them at last. It could be produced at the rate of about twopence per pound, but they produced so much in two years that they glutted the English market, and it would not fetch what it cost to produce and convey to Europe, and therefore the cultivation had to be abandoned. The production of wool had gone on gradually, there being an increase to the extent of £10,000 per annum, the amount this year exceeding £100,000. It would, therefore, be seen that, during the last few years, the colony had saved about £120,000 in luxuries, or else produced them themselves. Land capable of producing sugar or coffee could be purchased in the best localities at 20s. an acre, the depth of soil varying from eighteen inches to twenty feet. He had himself gone as low as twenty-five feet in depth. The cost of labour was about 10s. per month wages for an able-bodied man, and about 2d. per day for his food. So plentiful had food been of late, that white maize, known here as horse tooth maize, sold at 4s. the bag of three bushels, equal to 196 lbs.; it could be sent into England at a cost not exceeding 10s. per bag. The only difficulty was the want of capital for building kilns to dry the grain, so that it might bear transport across the Equator. What

kept Natal back was want of money; energy there was no lack of, though in many instances it had been wrongly directed. This evil was beginning to be remedied, but they could only borrow money at from 12 to 15 per cent. There were companies in London now advancing money at 12 per cent. on the mortgage of estates to the extent of one fourth of their value, and that cultivators could afford to pay such interest in addition to all their other expenses was quite sufficient proof that their business was sound. If only means could be supplied to develop her resources, Natal would become one of the brightest little spots England ever owned. He had made a good deal of money there, and had lost it all, yet he knew of no country, nor had he ever seen or heard of one, so beautiful in climate, where Providence appeared to be so kind to the inhabitants, or where a man could so thoroughly enjoy life. He intended to make it his home, to live and die there. He had brought up a family there, and though they had been educated in England, they were very glad to return to Natal. He could not agree with what had been said by Mr. Gooch with regard to the railways. There were certain districts where there would be difficulties in the way of railway construction, but generally speaking the country was of the character best adapted for such works. After you got a few miles from the port you came upon the same kind of soil as in Yorkshire, with a few feet, or even less, of stones, gravel, and sand, which would make capital ballast. Of course bridges would be required to cross the rivers, and there certainly was a deficiency of lime for masonry, except in the marble mines, and in the Klip River district. No doubt the climate would interpose some difficulties in the way of the English navy, who would require high wages; but there were no difficulties which could not readily be surmounted, and a railway constructed at a comparatively small cost. Indeed, if the resources of Natal were ever to be developed, railways must be made, for sugar, grain, and wool were all either heavy or bulky commodities, and, being grown in the interior, there were no means of conveying them to the coast but by ox-waggons, a tedious and expensive mode of transit. Thus grain, which was sold in Pietermaritzburg for 4s. a sack, cost 7s. 6d. when delivered at the port, and would cost 8s. 6d. when put on board, although the journey was only one of 50 miles. There was, therefore, a heavy tax on the agriculture of the country, which a railway would relieve; and he had no doubt that if England would only find capital to lay down, if it were only a tramway, the results from the carriage of wool and sugar alone would soon be very satisfactory. All that Natal wanted was money and people. He never saw a starving man there, or was asked for charity during his nineteen years' residence, except by a sailor. He had never known what it was for a man to come to his house without his being able to put before him more than he could eat. There was no necessity for the Government to offer land for nothing. There were hundreds of thousands of acres of land in private hands the owners of which would be glad to sell it at from 6s. to 10s. per acre, and he was prepared to find, within one week, 10,000 acres which could be rented at 1d. an acre for as long as a man liked to take them. Any man, sober, intelligent, and energetic, would be sure to prosper in Natal. He could say, most unhesitatingly, that he preferred Natal to England fifty times over, and he believed it was one of the choicest spots in the world.

Professor TENNANT said he should have been able to speak with more freedom had the subject before the meeting been Cape Colony, with which he was better acquainted; and he perhaps might be excused for referring to some letters which had recently appeared in the *Journal* with reference to the alleged discovery of diamonds at Hope Town, in the latter colony. On the table he had placed a diamond which he had received within the last month from Cape Colony; it had not been

described, but at the last meeting of the Geographical Society he had described two diamonds from there, which had been in London 12 months, and as no notice had been taken of them in any of the scientific periodicals, he had thought it right that their existence should be recorded. Allusion had been made to the substances found in association with these diamonds, and he had also placed upon the table specimens of these substances. In some quarters the whole matter had been characterised as a myth; whether that were so or not, he would leave the colonists to decide, but he had recently sent out certain inquiries, to which he expected a reply in the course of a few months. If it was a myth, he should be among the first to expose it. There was an instance recorded by Sir Roderick Murchison of diamonds being found in Siberia, but it was afterwards pretty plainly proved that they were deposited in the place where they were found by the person who found them. With regard to gold, it must not be supposed that this precious metal was to be found in Natal; it was a considerable way from there; and other states must be traversed in order to reach it. He had been much pleased with Mr. Hartley's straightforward statements, and would impress upon any who had not been successful at home, the desirability of carrying their energies elsewhere. The progress of Australia had been most astonishing during the last twenty years. He possessed the first gold nugget ever brought from that country, which he exhibited in that room in 1852, and since that time they had received one hundred and fifty millions sterling from the Australian gold-fields. The gold in South Africa was only spoken of as yet as occurring in small particles, but Mr. Baines, who had been through the district, had seen gold on the banks of the rivers, and had had a native gold chain given him for painting a portrait of one of the chiefs, so that there was no doubt of its existence, and it was now established that a certain quantity was continually being sent away from the coast by the Portuguese and others.

Mr. SARGEAUNT said he was quite prepared to confirm the statements of Dr. Mann and Mr. Hartley with regard to the resources of Natal. He had been intimately connected with the colony from 1852 to 1857 as Colonial Secretary, and might therefore be almost considered one of the nurses of its infancy. In 1854 (he believed it was) he had to consider the tariff, and having left England imbued with free-trade notions, he naturally as one of his first acts struck off the import duty on corn and flour, which, strange as it might appear in a new colony like that, actually produced a considerable revenue. He fully admitted that the interests of Natal were very much involved in the question of railways, and he might add that the reports which had been made on the subject, voluminous as they were, were now under the consideration of Mr. Gregory, President of the Institution of Civil Engineers, and it was expected that in a few days he would make his report as to what he considered the best and most economical means of carrying out railway communication in that colony. Two questions had been incidentally alluded to—the discovery of gold in South Africa, and that of diamonds on the Orange river. On the latter point he might say that he had read a letter from a gentleman holding a high official position at the Cape, and well-informed on such subjects, who stated that he fully believed in the *bona fides* of the discovery. He could not himself presume to offer any opinion upon this point; there was the positive assertion of the person who had found the diamonds, and against that there was the judgment of a person who he believed had visited the place in question. Under these circumstances he could only recommend the public to suspend their judgment until the receipt of more definite information. As to the gold, he understood that the gentleman who disbelieved in its existence had never been near the spot.

Mr. HARRY EMANUEL said that that Mr. Gregory, who was sitting beside him, had visited the Orange River, and

he brought back with him a sample of the stones and gravel from the bed of the river. He should like to ask Professor Tennant if he had ever known diamonds to be found in proximity to such deposits. He was not bold enough to affirm that diamonds were not to be found in South Africa, but if they were found in deposits of that character it would be quite a new fact in geology. With regard to the gold question, Mr. Gregory had not been to the spot, and only gave his opinion, but accompanying the prospectus of a company for working these gold-fields there was an extract from a letter from Mr. Mauch, in which he said:—

"I give you short notice that I have been very successful in finding gold, not in small, scarcely visible specks, but in great veins of quartz, *i.e.*, gold-fields, one of them more than sixty miles long, the other about twenty miles broad, besides numerous small parallel veins."

Afterwards the same gentleman writes:—

"Ivory, ostrich feathers, and gold, have always been considered the main products of Africa; ivory and feathers now form the greatest portion of the remittances made from here, but gold, aye, precious gold, known by all in its coined state as sovereigns, and longed for by all, has hitherto been hid from the eyes of nearly all in South Africa. But I speak of days now past, for Mr. H. Hartley, the well-known elephant hunter, may count amongst the results of his last hunt the discovery of two gold-fields of enormous extent, the first of which has been traced and seen in different latitudes to extend to more than eighty miles in length, by from two to three miles in breadth; the other is twenty-two miles broad, and promises to be most valuable, in fact, rivalling in value the diamonds recently found near Hope Town. I may mention that many smaller and isolated veins containing this precious metal have likewise been discovered. The vast extent and beauty of these gold-fields are such, that at a particular spot I stood as it were transfixed, riveted to the place, struck with amazement and wonder at the sight, and for a few minutes was unable to use the hammer. Thousands of persons might here find ample room to work on this extensive gold-field without interfering with one another. The above I can vouch for as facts, and specimens now in my possession will prove their truth."

The discoverer there spoke in a manner which would lead one to believe that the gold was self-evident to every eye, because there would be nothing particularly remarkable in the appearance of large veins of quartz which would strike him with such astonishment. And if Mr. Mauch abstained from picking up any of the gold, it was very strange that Mr. Hartley, the elephant hunter, did not think it worth while to pick out some. However, it appeared that seven men went up, for three months, and brought back between two and three ounces, which was not a very good return. He did not say there was not gold there, but before ships were advertised to sail for the gold fields of South Africa, and so on, a little more investigation should be made. Mr. Robinson quoted a letter from Dr. Taylor, in which he said, "It is very probable that gold-fields would be discovered equal to any in the world." That surely was not sufficient foundation on which to induce emigrants to set out for these gold-fields. Again, he said, "The quartz contains gold, and, I think, could be worked profitably in the wet season, with a proper crushing machine." Everybody knew that quartz-crushing, though very profitable, required considerable capital, and was not adapted to the capabilities of emigrants. Again, there was a certificate of the assay of a specimen of quartz from South Africa, which weighed 65 grains, or about the size of a walnut. He would ask anybody if it was not possible to go into the Welsh mountains, and pick out a piece of quartz weighing 65 grains exceedingly rich in gold; yet the average produce was not two ounces per ton. The produce from this South African specimen was given as at the rate of 1,185 ounces of gold per ton, and silver 60 ounces, worth something like £5,000. He repeated, he had no doubt of gold being found there, but it was a question whether it existed in such quantities that it could be profitably worked. As



to the diamonds, Mr. Gregory had searched very carefully the whole of the places where they were reported to have been found, and he failed not only to discover a single diamond, but even such a soil as diamonds are usually found in.

MR. GREGORY, being called upon, said he had found at Hope Town the geological character of the country quite different from what might be expected in a locality where diamonds were to be found. The specimens Mr. Emanuel had produced were from the exact locality where the diamond had been discovered which had been described in the Cape newspapers, and a cast of which had been sent to Professor Tennant. Two or three diamonds had since been found in the same spot, but all by the same man—a native, in the employ of a farmer—and it was reported at Hobart Town that this man found one under the stone upon which he ground his coffee.

MR. BERGTHEIL would have liked to learn from Mr. Gregory a more detailed account of how long a time he spent in the country, how he reached the spot where his investigations were conducted, and from whom he received his information. He (Mr. Bergtheil) was not a resident in Cape Colony, but in Natal; he knew Mr. Mauch, however, and had received him in his own house, and was ready to vouch for his veracity; he did not think that gentleman would ever say a word which he did not firmly believe to be true, although perhaps from his imperfect knowledge of English he might have rather highly coloured his statement. If there were a fraud in the matter of the diamonds—and it could be nothing else if they were not really found in the place asserted—he would leave the people of Cape Colony to defend themselves, but from his knowledge of the country, he knew no reason which could induce any man to go to the Orange River Free State and there lodge diamonds for the purpose of their being afterwards found and sent to England. Mr. Gregory had probably gone as rapidly as possible through the country, and if he expected Dutch farmers to tell him where there were diamonds he was much mistaken, and knew very little of the character of the people. He ought to have remained there at least six months before he made his first inquiry, and then, knowing with whom he had to deal, he might possibly have come to a right conclusion. This would, in his opinion, have been a much better plan than rushing through the country, and then coming home and contradicting a man whose character stood very high in the colony. He was not aware of any desire on the part of anyone to underrate the difficulties in the way of successful gold-mining; it was undoubtedly a long way from Natal to the gold districts, and the mode of travelling in that part of the world was by ox-waggons, at the rate of about twenty-five miles a day, and if the man who acted as guide happened to be in a bad humour there was no getting on at all. English gentlemen were too apt to form their conclusions on African subjects from the standard they were accustomed to at home, which often led to error. It had been suggested that if gold really existed in any quantity more would have been brought into the colony, but there had not been time yet. If Mr. Mauch or any one else came to Natal and reported that he had found gold, the people would take nearly three months to think about it; then, when they started, they would take six months to reach the spot, and if the brandy had run out, in all probability they would turn back again. He quite believed Mr. Mauch's statement, but it would be a considerable time before gold would be found in sufficient quantities to induce English emigrants to go there in any number. The company to which allusion had been made was not started for the purpose of inducing emigration, but to ascertain the truth, and so lay a foundation for future operations.

MR. EMANUEL desired to state that he did not intend to impute fraud to anybody.

MR. ROBINSON, who had recently returned from Natal,

desired, in the interests of truth, to give some explanation of Herr Mauch's somewhat glowing description of what he had seen. The same objection which had been taken by Mr. Emanuel was made in Durban by a party of gentlemen before whom Mr. Mauch appeared, and he then said that he used those words, not with any desire to induce persons to seek the colony, or from having any private interests to serve, but simply as an enthusiastic explorer. He said that when he saw these long reefs of quartz glittering in the sun, and knew, as he did know by previous examination, that they did contain gold in a greater or less quantity, he was transfixed with astonishment at the idea which then presented itself to his mind as to the great future which might be opened up to South Africa by that discovery; but, from his limited knowledge of the English language, he used words which might bear an exaggerated interpretation. There was no doubt of the existence of gold there, and the only question was whether in such quantities as to be worth seeking, and with a view to determine this question several parties of colonists, at a considerable sacrifice to themselves, had recently gone on exploring expeditions, and this fact alone was a sufficient proof that there was some foundation for the report; he should much regret if a spirit of incredulity at home should lead to the abandonment of any steps that might have been taken to follow up this discovery. South Africa had been for a long time under a cloud, and it was felt that this would speedily be dispersed if the joint discovery of coal and gold led to a rapid influx of population, and to the advancement of civilisation and commerce in that part of the world. It was not necessary for him to endorse the statements of Dr. Mann and Mr. Hartley, but as a member of the Local Legislature, editor of one of the oldest journals there, and a nineteen years' resident, he might be allowed to say that, although he had gone through many vicissitudes during that period, he regarded Natal as the land of his adoption, his own home, and that of his children, and he believed that, to any man with industry and energy, it afforded a fine field for enterprise. He would, nevertheless, be very sorry if any remarks made on that occasion should lead persons to go out there with exaggerated ideas. If a man wished to succeed he must do it by energy and perseverance, but he believed that no man who went out prepared to face all difficulties would ever have cause to regret it. He had seen the colony emerge from the condition of a wilderness to one of comparative civilization in 19 years. Undoubtedly many men had been disappointed, but that was always the case with pioneers, and those who were now succeeding the first settlers would have the satisfaction not only of inheriting the advantages which others had prepared for them, but of carrying forward the work of civilization. The present time presented a singular juncture of circumstances, for at the same moment that gold was being discovered to the north of the colony and coal in Natal, there were indications, which he would not then go into, leading to the belief that ere long there would be a considerable extension of British rule in that part of the globe.

The CHAIRMAN, in proposing a cordial vote of thanks to Dr. Mann for his interesting and instructive paper, said he hoped the advantages which had been laid before them would be appreciated, and that Natal would be benefited by the introduction of railways, capital, and population. But all young colonies had difficulties to contend with, and though it was difficult to get English people to leave their homes, still, if they could not find work at remunerative wages here, and good prospects were held out to them abroad, they must be very foolish not to avail themselves of the opportunity. That there was this indisposition to leave home he had himself seen instances of, particularly in the midland counties, where he had known men refuse a good situation on a railway, and go back to a miserable life at 8s. or 9s. a week, rather than leave their homes. Happily this was not the case with all, and in Cathness the people



seemed glad to leave home, although the average wages there were higher than in the midland counties of England. He had been rather startled on first hearing the amount of rainfall in Natal, and was disposed to recommend it as a good place for umbrella makers, but, on finding how the rain was distributed over the twelve months, he did not see anything to be alarmed at. He did not think the gradients of the proposed railway were so very excessive, as by his calculation they only came out about 38 or 39 feet in a mile. He concluded by moving a hearty vote of thanks to Dr. Mann.

The vote having been carried,

Dr. MANN, in acknowledging it, briefly referred to the gold discoveries, saying that his only desire was to elicit the truth, and pledging himself as an honest man, that whatever might be the results of the present investigations, they should be laid before the world as speedily as possible, and that any information obtained should be common property. At that late hour he felt unable to touch upon the many interesting topics that had been referred to in the discussion, but he hoped to have other opportunities of returning to the subject.

Mr. HYDE CLARKE writes:—"As so many gentlemen connected with the colony of Natal spoke last night, and the discussion drifted to the gold question, I abstained from addressing the meeting, although I was induced to do so by Dr. Mann's reference to the introduction of opium among other products. While in Asia Minor, I received frequent applications from relatives and friends in the South African colonies as to Turkish productions, and was able to supply some information, and specimens of tobacco and silkworm eggs. These circumstances led me to entertain the opinion that there are few products and animals of Asia Minor which cannot find a suitable climate in South Africa, but particularly in Natal. In order, however, to carry out most efficiently some of these branches of enterprise, it would be useful that competent natives should be obtained from Asia Minor, and I do not conceive there would be any difficulty in obtaining such by the assistance of the Ottoman Government, and in co-operation with the Mussulman inhabitants of Cape Town and Port Elizabeth, who are under the spiritual patronage of the Sultan. By proper care the products of our South African colonies might thereby be much increased in opium, tobacco, silk, Angora wool, &c. As to the railway question, the gradient of 7,000 feet in 180 miles, which has been put forward as an objection, does not constitute any real difficulty, because the fall is in the direction of the bulky traffic, which is export traffic, the traffic against the gradient being the lighter proportion of imported commodities. If the railway be fairly carried out, experience shows it ought to meet the guarantee by the increase of the taxable value of the country, consequent on the expenditure of capital in the construction, and on the increased facilities for the shipment of produce, and thereby a stimulus given to greater cultivation of land. One important recommendation is omitted by Dr. Mann, and that is, that a trunk line in Natal will give the colony better access to the great back country, and, consequently, a greater amount of exportable produce. The value of Natal depends not solely on its own resources, but on the fact that it is the chief outlet for the vast territory in the interior. The more I have looked into the question of the railway, the more I am convinced that theory and experience equally dictate that the railway system should be brought into operation in Natal at the earliest possible period, as the indispensable step for efficiently promoting the development of the colony.

32, St. George's-square, S.W., 3rd Dec., 1868.

## ON THE ALLEGED POISONOUS QUALITY OF BEEF-TEA AND EXTRACT OF MEAT.

By BARON LIEBIG.

(Extracted from the *Lancet* of November 21st.)

Although it is contrary to common sense to believe that the daily food of men and animals could possibly contain a substance injurious to health, it was nevertheless to be expected that the experiments made by Dr. Kemmerich on the effect of beef-tea and its salts on animals would produce anxiety and fear in some weak minds; and indeed the article which appeared in *Once a Week*, entitled "A Word of Warning to Cooks," is a proof that such fears really existed. I believe, however, that a simple acquaintance with the experiments of Dr. Kemmerich will be sufficient to dispel them completely. The results of these experiments are of a very harmless character. Dr. Kemmerich made most of his experiments, not upon men, but upon graminivorous animals—viz., upon rabbits,—and only one experiment was made by him upon a dog. The broth was made from horseflesh, and injected into the stomach of the animals in progressively augmented quantities, the chief results of which are as follows:—

A rabbit weighing not quite two pounds, which had received the broth from one pound of horseflesh (equivalent to half an ounce of extract) remained perfectly well. It polished itself with its paws, was very lively, and no disturbance in the state of its health was afterwards perceptible.

A second rabbit, of two pounds weight, into the stomach of which the extract of one pound and a quarter of horseflesh had been introduced, departed itself in just the same manner; its pulse became more vigorous, its breathing slower, and it remained lively and healthy.

When, however, the doses were increased, and the extract of two pounds and of two pounds and a quarter of flesh were injected into the stomach of the rabbit, such quantities of concentrated animal food were evidently too much for the little graminivorous creature, which by such doses Dr. Kemmerich succeeded in killing, a result at which nobody will be surprised. It follows that Dr. Kemmerich could likewise have killed stronger animals with beef-tea; and it may be assumed that he would have killed even a man of 140 lb. weight (seventy times heavier than the rabbit) by a dose of beef-tea seventy times as large—namely, by the broth of 140 lb. of flesh, equivalent to about 4 lb. of extract of meat. Less than a couple of pounds of extract would, however, scarcely have been sufficient, for one of the experiments of Dr. Kemmerich on a carnivorous animal contrasted with the experiments on the rabbits; he did not succeed in poisoning that animal with beef-tea.

It was a small but very strong terrier which had taken the broth of four pounds of flesh (equivalent to two ounces of extract), which the animal seemed to enjoy considerably. As however the whole quantity was too much for it, it became necessary to inject the remainder into its stomach. Notwithstanding the enormous quantity of extract of meat which had been introduced by force, the terrier remained very comfortable and lively, and no symptom of any disturbance of its health became manifest. Double the quantity of meat broth which killed the rabbit had not the least injurious effect on the little dog.

These experiments and the above calculations show sufficiently what is to be thought of the poisonous effect of beef-tea; it belongs to the category of cases where people have eaten *pâté de foie gras*, turtle soup, or oysters to such excess as to cause death; but no sensible person will ever think of ascribing, on that ground, poisonous qualities to *pâté de foie gras*, turtle soup, or oysters.

The experiments of Dr. Kemmerich are described in his *Dissertatio inauguralis* for obtaining the degree of doctor from the medical faculty at Bonn; and in connecting with his conclusions the meaning of the word "poison," he in fact succeeded in drawing to his work the attention

of the public, which otherwise would probably have taken little notice of it.

Dr. Kemmerich ascribes the effect of beef-tea not to its aromatic and combustible ingredients, but to the potash salts which it contains, and of which it is well-known that in larger doses they exercise an injurious effect on the organism; nevertheless—and this is a matter of great importance—potash salts are an element of all articles of food; they not only form the chief ingredients of the salts of all sorts of flesh, including the flesh of fish, but likewise of all other food, and of all the food of animals. The alkaline salts of bread, vegetables and hay, consist of potash salts, and with the exception of chloride of sodium (kitchen salt), soda salts are but rarely contained therein; in fact, it may safely be asserted that without the potash salts our food would be quite unfit for nourishment.

It does not follow, therefore, that these salts, when taken in excess, like any other—even the most harmless substance—might not eventually exercise an injurious effect. It is, however, preposterous to apply the meaning which we are accustomed to attach to the word "poison" to the effects of such an excess. It is surely quite absurd to connect this meaning with the substances which we daily take in our food, and which are quite indispensable to our existence.

Dr. Kemmerich himself says (p. 31),—"I do not think of the possibility that beef-tea, in the form in which it is used for household purposes, could be the cause of poisoning; it therefore does not require a medical warning to protect from poisoning with Liebig's extract of meat." He further says:—"In medical practice, wine, ether, camphor, and musk are eminent analeptica (invigorating and refreshing remedies). Compared to these giants of medicine, beef-tea modestly occupies a subordinate position. If, however, it be necessary to preserve the exhausted body from protracted illness, then there is no other remedy in the whole rich store of medicine which can afford such assistance for regenerating the diseased organism as repeated doses of beef-tea."

One of the three theses defended by Dr. Kemmerich, on his promotion before the medical faculty at Bonn, is worthy of observation by the British Navy. It runs thus:—

Thesis 2. The best remedy against scurvy is beef-tea, or Liebig's extract of meat."

Munich, Nov. 1868.

## Fine Arts.

EXHIBITION AT ARRAS.—The town of Arras, not far from Amiens, is little known in the artistic world, except in relation with the old tapestry which formerly bore its name, but there is enough of taste there to make a picture exhibition successful. That which was recently closed has been eminently so, and the purchases amount to thirty thousand francs, a large sum for a provincial town of the second or third class. It is still more satisfactory to note that the pictures sold include several by eminent artists, such as a "Calvary," by M. Desiré Dubois, a fine half-length figure of an Armenian woman, by M. Charles Laudelle; a composition by M. Viger, representing "Josephine Beauharnais, afterwards Empress, during the Reign of Terror;" a view of the Palace of Westminster, by M. E. Bénard; a landscape, by M. Corot; and several other remarkable works. Such a result throws some other and larger provincial towns than Arras completely into the shade.

## Manufactures.

NEW PROCESS FOR MAKING WINE.—The *Markt-bericht*, quoted in the *Produce Markets Review*, speaking of a process known as Menada's, says:—"Menada finds that

to preserve the full bouquet and flavour of wine the fermentation must be exceedingly slow, and for this purpose he has adopted the following method. After the bunches of grapes have been stamped the must and stalks are put into the vat, which, however, is only four-fifths filled: the opening is either closed with the flap generally used in vats, or with a cork. Through this a ten-inch tube is put, to the end of which a bladder is tied, after which all small openings are carefully closed up with cement. The fermentation begins after twenty-four hours, and develops carbonic acid gas, which presses into the bladder and squeezes it out almost to bursting point till the second, third, fourth, or fifth day. The carbonic acid gas, and the watery particles, escape through the pores of the bladder, while the alcohol and aroma are left behind. On the fifth, or at the latest, the eighth day, the bladder collapses, and this is a sign that rapid fermentation is at an end, and the wine can then be drawn off, or, what is better, it can be left alone until the following March, at which time the wine will be quite clear, and rich in aroma and flavour. After the wine has been drawn off, what remains in the vat can be pressed; or a very weak wine can be poured on to it, which, if drawn off from the eighth to the fifteenth day, will prove of excellent quality. This process, by which less, but therefore better, wine can be obtained, can also be applied to sour grapes; these, however, should not be trodden, but put whole into the vat, and left alone till the following March, after the fermentation has taken place. Other wines and spirituous liquors may be improved by this process. A small piece of bladder is sufficient, which is to be left throughout the summer on the top of the tube projecting from the vat."

GLASS WORKS IN THE NEAPOLITAN PROVINCES.—The manufacture of glass in the Neapolitan provinces has of late years fallen off considerably, owing to the proprietors not being willing to keep pace with the times, and not having introduced modern improvements in this branch of trade. The most important glass works in the provinces of Naples and Salerno are those of Portici, San Giorgio, near Cremano, and Bagnoli; these establishments employ 232 workmen, and produce annually about 30,000 metrical quintals of sheet glass. At the Portici works a Siemens furnace has been lately introduced; the other works, however, have not yet abandoned the old-fashioned furnaces.

MECHANICAL INDUSTRY IN ITALY.—One of the most important mechanical establishments in Southern Italy is that of Pietzarsa at Naples, belonging to the Società delle Industrie Meccaniche. These works employ about 1,250 persons, and are furnished with 300 machine tools driven by nine steam-engines, amounting in all to 88 horse-power. At this establishment they make locomotive carriages and every description of railway plant, iron bridges, boilers, cranes, pumps, war material, and marine engines up to 500 horse-power.

## Commerce.

DECIMAL COINAGE IN GREECE.—According to *La Presse*, the decimal system is about to be adopted in Greece. The unit will be the *dramma*, equal in value to a franc, and its hundredth part will be called the *septa* or centime.

PRODUCTION OF HONEY IN ITALY.—Notwithstanding the little attention given by the Italian peasantry to their bees, the produce of honey during the present year amounted in value to 1,385,000 francs, and that of wax to 1,590,000 francs. The best honey comes from Bormio, Empoli, and Otranto.

CONSUMPTION OF COAL IN ITALY.—The consumption of coal in Italy at the present time is estimated at upwards of eight millions of tons per annum, of the value of 360,000,000 francs (£14,400,000), the average cost per ton being 45 francs.

**PRODUCTION OF COPPER IN THE LIGURIAN PROVINCES.**—The working of copper-mines on the Ligurian coast may be traced to a very remote era. The ore, generally speaking, is a copper pyrites, which yields from 10 to 12 per cent. of copper. The greater part of the ore obtained from these mines is exported to Swansea, where it realises about 200frs. per ton. The Apennines, on the coast between Genoa and Spezzia, appear to be the richest in copper veins. The most important mines are the mines of Loretto, Gallinaria, and Libiola, in the neighbourhood of Sestri, about half-way between Genoa and Spezzia. In 1862, 165 tons of copper-ore were extracted from the mines of Monte Loretto, the working of which is at present abandoned. The mines of Gallinaria, in the commune of Casarza, produced, in 1867, 236 tons of ore, containing 12 per cent. of copper, whilst that of Libiola, in the commune of Sestri, produced last year upwards of 1,487 tons of copper-ore. The next in importance are the mines in the neighbourhood of Levante, and if they do not yield as much as those of Sestri it depends on the stupidity of the proprietors, who work them in a most primitive manner. At Monte Gove copper occurs in filaments and branches in a gangue of quartz. Numerous deposits of copper are met with in the Val d'Aveto, in the neighbourhood of Torriglia, and in the communes of Apparizione, Struppa, and Saint Olave, which might be worked with advantage. The Apennines to the west of Genoa, although not so rich in copper as those on the east, still contain numerous deposits of this mineral, which might also be worked to advantage. The principal veins occur from Sestri-ponte to Voltaggio, and it is met with at Biccica, Acquastiate, Prateccia, and Monte Lecco, over an extent of four to five kilometres, at but a short distance from the road, which would tend greatly to facilitate the transport when once the working of the mines was commenced. At the present time the total production of copper ore from the Ligurian mines amounts to about 2,000 tons per annum; but this industry might be greatly developed by opening new mines, and by improvements and economy in the working of the old ones.

### Colonies.

**SOCIAL PROGRESS IN AUSTRALIA.**—The altered circumstances of the country, and the great changes that have been introduced in the management of pastoral properties, have produced great alterations for the better in the character and stamp of the labouring men in the bush, and in no less is this improvement more apparent than in the shearers. The extravagance of days gone by, though not yet totally extinct, is every season becoming scarcer, and is gradually but surely being supplemented by the provident settler, who, in the slack season of the agricultural year, hurries away from his homestead, and increases his profit by shearing excursions. Under the old system, nine shearers out of ten knocked down the large earnings of the short but busy shearing season in a few days of extravagance, and then struggled through the remainder of the year in poverty and indigence. This sort of thing is, however, gradually dying out, and a large proportion of the gains of the wool-shed are now carried to the holdings of the smaller settlers, and there expended in the permanent improvement of their homesteads. With the general adoption of fencing, the shepherd is also fast becoming an institution of the past, his place being usurped by the more active and advanced boundary rider. All these changes are for the better, and are evident marks of improvement in the social condition of the labouring population of the bush.

**SHEARING IN NEW SOUTH WALES.**—The rate of wages for shearing in this colony is now 18s. per 100. Thus on the 10,000,000 sheep to be shorn this season in Riverina

and the pastoral districts of New South Wales the wages paid will amount to £90,000. A top shearer can shear about 80 sheep a day; an inferior hand can shear 40. Extraordinary attention is being paid to the getting up of the clip on some stations.

**LAND IN TASMANIA.**—The *Hobart Town Mercury* says that there is now before the Legislature an amended Waste Lands Act, which is considered a great improvement on those already in existence, inasmuch as it initiates a system different in some very material points from any already tried. Fourteen years are allowed for the payment of £1 per acre, with the addition of interest in equal annual instalments, so that a person who selects, for instance, an allotment of 100 acres has to pay in all £133 6s. 8d. in fourteen instalments. The payments are regulated in the following way:—

100 acres, at £1 .....	£100	0	0
Add one-third for credit .....	33	6	8
	£133 6 8		
Cash at time of purchase .....	£3	6	8
First year .....	5	0	0
Second year .....	5	0	0
Succeeding 12 years £10 per annum .....	120	0	0
Total .....	£133	6	8

### Notes.

**THE MONT CENIS TUNNEL.**—During the first fortnight of the past month (November) the progress made at the Mont Cenis Tunnel was 55·85 metres; of which 28·70 metres were driven on the Italian side, at Bardonnèche, and 32·15 metres on the French side, at Modane. The position of these works up to the 15th November was as follows:—

	Metres.
Length driven at Bardonnèche ....	5,287·00
Length driven at Modane .....	3,726·90
Total length of tunnel driven .....	9,013·90
Length remaining to be driven ....	3,206·10

Total length of tunnel .... 12,220·00

**THE SUEZ CANAL.**—From the 15th September to the 15th October, the excavation for the Suez Canal amounted to 2,038,196 cubic metres. The position of these works up to the 15th October was as follows:—

	Metres cube.
Amount excavated up to 15th September, 1868 .....	49,309,522
Ditto from 15th September to 15th October .....	2,038,196
Total amount executed up to 15th October .....	51,347,718
Remaining to be excavated .....	22,764,412
Total excavation in line of canal..	74,112,130

**EXHIBITION OF BEES AT MILAN.**—An exhibition of bees will be held at Milan, in the Palazzo del Regio Istituto Tecnico Superiore, from the 10th to the 13th of December, under the auspices of the central association of agriculture in Italy. It will comprise a collection of all kinds of bees, honey, and of instruments and utensils employed in apiculture, for which various prizes will be distributed. A silver medal will also be given for the best mode of taking the honey without destroying the bees.

**RE-NAMING OF PARIS STREETS.**—A new and long list of changes of names of places and streets has recently appeared in the *Moniteur*. In cases where new openings are in the line of old streets the name has been continued

in the former, and where two streets forming one line had different names one of these has been suppressed. The names adopted are in some cases those of French departments, and one takes that of the new settlement of Saigon, in Cochin China, but the greater portion are those of celebrated men of past or present times, and foreign as well as French philanthropists, authors, musicians, artists, engineers, doctors, and others. The following are the best known—Cail, Abbé Groult, Murillo, Rembrandt, Abbatucci, Hippolyte Lebas, Milton, Condorcet, Perdonnet, Bréguet, Froment, Sibuet (Archbishop of Paris), Sœur Rosalie (the charitable nun, recently deceased), Regnault, Léonard de Vinci, Eugene Delacroix, Faraday, Torricelli Poncelet, Brunel, Condamine, Boissieu, Tardieu, Séguin and Secrétan.

**EMPLOYMENT OF FOWLS IN DESTROYING WORMS.**—The French farmers complain terribly of the prevalence of worms, which make sad havoc in corn and other lands, the highest cultivated fields being the most infested with these destructive pests. Fowls are known to be the most indefatigable worm destroyers; they pursue the devastator with extraordinary instinct and tenacity. But fowls cannot conveniently be kept upon every field, nor are they wanted there at all seasons. M. Giot has therefore invented perambulating fowl-houses, large omnibuses fitted up with perches above and nests beneath; the fowls are shut in at night, and the vehicle is drawn to the required spot, and, the doors being opened in the morning, the fowls are let out to feed during the day in the fields; knowing their habitation they enter it at night-fall without hesitation, and roost and lay their eggs as well as in any other house. The plan is said to answer admirably in every respect.

**POPULATION OF THE NORTHERN CONFEDERATION.**—The office of statistics at Berlin has just published the result of the census of the 3rd December, 1867, in the Northern Confederation. From this it appears that the number of inhabitants at that date was 29,758,552 souls, to which must be added 98,879, the number of persons absent from the country, making a total population of 29,857,431 souls.

### Correspondence.

**DIAMONDS AT THE CAPE COLONY.**—SIR,—I have to ask the favour of a few lines in your columns, to allow of my replying to a letter signed "John Robinson," published in your impression of the 20th Nov., which not only contradicts, without the slightest attempt at argument, the statements set forth in my communication printed in your issue of the 13th Nov., but also unfairly imputes to me "a direct reflection upon the veracity of the many high and responsible officials who have borne testimony to the discovery,"—i.e., of diamonds at the Cape. An unbiassed perusal of my letter would reveal to Mr. Robinson that I opined the Government officials had been deceived by the erroneous conclusions of incompetent scientific guides, and by the concocted representations of interested parties; nor is such a scheme without precedent, as some years ago diamonds were brought to market purporting to have been found in Silesia, but the imposture was discovered and traced home to its origin. In answer to Mr. Robinson's fairer treatment of my remarks about the "gold-fields," I would beg leave to say that nothing is further from my wish or intention than to deny the existence of gold in South Africa, either in the places designated by Mr. Mauch, or elsewhere; but I think I am justified in protesting against the use or abuse of the term "gold-fields," at so early a stage, and without better foundation than the few scanty facts as yet known. My observations were, that although gold may and doubtless does exist in South Africa, as it does indeed in most parts of the world, England included, yet it is not

there in sufficient quantities to pay to work, nor to warrant the name of gold-fields, so pompously applied to them. I need no better corroboration of my remarks than Mr. Robinson's own authority, quoted in his letter, as follows:—"I refer to Dr. Taylor's letter, published in the *Natal Mercury* of September 22nd. Among his remarks are the following—'From my own observation, I do not think it would be advisable for any one to go there from Natal with the idea of making a living by gold-digging, as none has yet been discovered in the alluvial deposits or rivers; but it would be desirable to send prospecting parties into the country supplied with requisite tools and provisions for twelve months.' Arrangements should be made with the Matabels to work in safety, and it is very probable that gold-fields would be discovered equal to any in the world." Mr. Robinson fails to give us, verbatim, the evidence of his "chief authority," Mr. Mauch, the which omission I beg to mend; for though this testimony is not in accordance with Dr. Taylor's and Mr. Gregory's views, yet it is so very decided and unequivocal that I think it ought to be made known. In the prospectus (recently issued) of the South African Gold-fields Exploration Company, there is an extract from a letter of Mr. Mauch's to the *Transvaal Argus*, to the following effect:—"December 3rd, 1867,—Ivory and feathers now form the greatest proportion of the remittances made from here, but gold, aye, precious gold, known by all in its coined state as sovereigns, and longed for by all, has hitherto been hid from the eyes of nearly all in South Africa. But I speak of days now past, for Mr. Hartley, the well-known elephant hunter, may count among the results of his last hunt the discovery of two gold-fields of enormous extent, the first of which has been traced and seen to extend to more than eighty miles in length, by from two to three miles in breadth; the other is twenty-two miles broad, and promises to be most valuable, in fact rivalling in value the diamonds recently found near Hope Town. The vast extent and beauty of these gold-fields are such, that, at a particular spot, I stood as it were transfixed—struck with amazement and wonder at the sight, and for a few minutes was unable to use the hammer." Any one reading this remarkable account would certainly imagine that the place referred to, if not precisely "Aladdin's Cave," yet abounded in visible gold in immense quantities (for a mere range of quartz rocks could not prove such a bewildering sight to an experienced traveller like Mr. Mauch); and I am unable to conceive why Mr. Mauch, or Mr. Hartley, at the least, who, I am informed, hunts the elephant as a commercial speculation, did not avail himself then, or during the year's interval, of the golden harvest; nor how it is, in face of these discoveries, that the Cape colonists have not turned them to better account. It is just possible that quartz-crushing in these regions might prove profitable, and constitute a proper field for the enterprise of a company, were the country easy of access, and under strong and peaceful rule; but I leave it to the sense of your readers to decide whether, on the data as yet furnished, there is justification for a call on the general body of emigrants. When I see ships advertised here to sail for the "gold-fields," and the announcement of a new source of auriferous supply blazoned forth in the Cape newspapers, I do think a few words of timely warning are necessary, to prevent individual emigrants rushing on an enterprise (fitted at the best for associations only), and proceeding to a colony where subsistence is dear, notwithstanding the comparative cheapness of meat and vegetables. In conclusion, let Mr. Robinson rest assured that "not all the disfavours," with which, he says, "South Africa and its affairs are regarded in many quarters, will defer indefinitely the day when this source of wealth is to be turned to practical account," nor prevent thousands upon thousands of emigrants hurrying to share in such riches when once it is established that they really have existence.—I am, &c., HARRY EMANUEL, F.R.G.S.

**EDIBLE FUNGI.**—**SIR,**—Attention has of late been drawn to fungi as an article of food, in this *Journal* and elsewhere; it is to be hoped with good results. So long as such pleadings on behalf of neglected aliments are addressed to the intelligent and educated, there is not much danger of their being abused, but, unfortunately, the influence, without the judgment, is likely to spread to the uneducated and reckless, with results not equally satisfactory. It is very questionable whether the great bulk of our agricultural population ought to be tempted to indulge in fungi to a greater extent than at present, because, after all, the discrimination of good from bad must chiefly depend upon botanical characters, and is not to be determined by any one unfailling test. Good service would be rendered by anyone who would make known some golden rule whereby to distinguish esculent from deleterious species, but hitherto all such attempts have failed. Even that of Mr. John Bell, alluded to in your *Journal*, will not, I fear, stand the test of experience. It is an undoubted fact that we have at least twenty\* good species of esculent fungi which could be well recommended, and easily distinguished by anyone of ordinary intelligence, accustomed to note the differences in natural objects. That the great mass of our population are unable to appreciate the differences between different species of the larger fungi has evidence in the fact that so very few of them have distinct local or popular names. If they had I should have greater hopes of the success of any plan for their wider utilisation. A countryman never mistakes a blackbird for a rook, but his knowledge of them and their differences is quite apart from their zoological characters. Until children can be taught to distinguish *Coprinus comatus* from *Agaricus fascicularis*, although they differ much more from each other than the rook from the blackbird, there is little hope; and until they know them by distinct names (not in binomial Latinities), both are still likely to be called "toadstools," and if one is recommended to be eaten, both are likely to be tried with dangerous results. One of the best, and, as I conceive, the only practical way of extending information safely, is by the publication of good unmistakable figures of edible and poisonous species, like the two sheets by Mr. W. G. Smith. Mere description is valueless. With the very best instruction accidents are sure to accrue. Now, whilst in many districts only one kind, called mushrooms, are supposed to be edible, and all the rest "toadstools," and dangerous, we are constantly hearing of fatal results, produced through ignorance or carelessness. If in such places it comes to be believed that twenty kinds, instead of one, are edible, I fear that in the same ratio accidents are likely to increase, unless, at the same time, it is urged, equally strongly, that there are a greater number that cannot be eaten under pain of death. I am led to make these remarks under the conviction that the greatest caution should be used in inducing the public to depart from the old custom of eating only one or two species, unless some knowledge is possessed or acquired of some of their most prominent botanical characters.—I am, &c., M. C. COOKE.

**POISONOUS MUSHROOMS.**—**SIR,**—The letter from Mr. Christopher Cooke, in your issue of November 13th, requires a few words of comment. First, to dispose of the death of the waterman who ate poisonous mushrooms and died the same evening, "with all the symptoms of mushroom poisoning" (*vide Lancet*), I would ask, Is it possible to distinguish the symptoms of mushroom poisoning from the general symptoms of narcotic poisoning in general? Vomiting does not always ensue, but from my own experience of dangerous fungi (and I have tried some hundreds) the general effect on the system is precisely the same as that described in all narcotic poisoning. At the time this particular death occurred,

London and its environs were overwhelmed with mushrooms, "real and spurious" (to use Mr. Cooke's words); they were displayed on costermongers' barrows at every street corner, and were generally semi-putrid and of different species. I am assured that few persons could partake of such food without serious illness, or even death; all fungi (and, indeed, nearly all articles of food) become dangerous poisons when decomposition has once set in. The evidence of such persons as "cooks at inns," "nieces of hotel keepers," and country folk in general, is utterly worthless; and surely Mr. John Bell's test is of little more value, for who would think of eating fungi abounding with "pungency like pepper!" But even this does not hold good, for many highly dangerous species are perfectly mild when first eaten, and the deleterious qualities are not manifested till the fungi have been in the stomach for some time. Little dependence, too, can be placed on the colour of the gills, which vary according to the age of the plant, from the palest rose to full pink, chocolate, and finally black. But surely no one who had ever seen a true mushroom (*Agaricus campestris*), and had its peculiarities pointed out, could ever mistake another species for it, unless, indeed, it was the very near and wholesome ally, the horse mushroom (*A. arvensis*), the common species of Covent-garden-market, distinguished from the former principally by its more robust growth, whiter top, and paler gills. The true form of the mushroom never grows in woods; yet only last year a whole family was poisoned (one to death) by fungi gathered from a wood, and that, too, by a species noted for its offensive and forbidding odour (*A. crustuliniformis*); the *bona-fide* mushroom never grows on decaying stumps, but always in rich meadows; the whole plant is fleshy, has a delicate and inviting odour, a dry, whitish floccose top, and (which is of great importance) an irregular ring or collar round the upper part of the stem; if the stem is cut off, and the top laid gills lowermost on a sheet of writing paper, a profuse purple brown dust will be deposited from the gills; this dust (the colour of which is most important) consists wholly of the seeds or spores of the fungus. The above characters distinguish *Agaricus campestris* from every other of the six hundred species of *agaricus* found in this country. Our knowledge of the qualities of these plants is at present very imperfect, but I know that the majority of British species are not only wholesome and nutritious, but delicious articles of food; that they require to be known, I admit, but the knowledge of this subject, like the knowledge of all others, is not to be acquired in a few minutes by a royal road, neither is there at present any known chemical test whereby a poisonous species may be at once detected. To select only such mushrooms as are perfectly fresh, and grow in rich, open pastures, and to pass by all such as grow on or about stumps and in woods, is a golden rule for beginners.—I am, &c., WORTHINGTON G. SMITH.

#### MEETINGS FOR THE ENSUING WEEK.

- MON.....Society of Arts, 8. Cantor Lectures. Mr. W. H. Perkin, "On the Aniline or Coal Tar Colours."  
Royal Inst., 2. General Monthly Meeting.  
Society of Engineers, 74. 1. Mr. Ewing Matheson, "On the Accumulator Cotton Press." 2. Mr. Baldwin Latham, "On the Application of Steam to the Cultivation of the Soil."  
Entomological, 7.  
Medical, 8.  
Victoria Inst., 8.  
London Inst., 6.  
TUES ...Medical and Chirurgical, 84.  
Civil Engineers, 8. Discussion upon Mr. Wheeler's paper, "On the River Witham and its Estuary."  
Photographic, 8.  
Ethnological, 8. 1. Mr. H. H. Howorth, "The Westerly Drifting of the Nomades from the Fifth to the Nineteenth Century." 2. Col. Lane Fox, "On some Flint Implements found associated with Roman Remains in Oxfordshire and the Isle of Thanet."  
WED ...Society of Arts, 8. Mr. C. Tomlinson, F.R.S., "On the Drying Properties of various kinds of House Paint."  
Geological, 8.  
Graphic, 8.

\* Perhaps double that number, but all are not equally good, or as readily distinguishable.

Microscopical, 8. Dr. H. C. Bastian, "On Mounting and Tinting Sections of Animal Tissue."  
R. Literary Fund, 3.  
Archaeological Assoc., 8.  
THUR ...Royal, 8½.  
Antiquaries, 8½.  
Zoological, 8½.  
Royal Society Club, 6.  
Mathematical, 8.  
FRI .....Astronomical, 8.  
SAT .....R. Botanic, 3½.

## Patents.

*From Commissioners of Patents Journal, November 27.*

### GRANTS OF PROVISIONAL PROTECTION.

Ammunition, supplying to troops under action—3478—T. Martin.  
Bales, hooping—3417—W. Riddle.  
Bollers—3468—J. Howard and E. T. Bousfield.  
Boots and shoes—3445—W. Thomas.  
Braces—3382—S. Arnott.  
Buffers, &c.—3385—H. Steffansson.  
Cabs—3454—R. A. Gold.  
Cannon wads, &c.—3381—J. C. Haddan.  
Carding engines—3452—T. and A. T. Lawson.  
Carding engines—3467—W. Richardson.  
Carriage doors, fastening—3369—T. and T. P. Lucas.  
Carriage shafts, safety stay for—3428—G. Piercy.  
Castors—3474—J. C. Bowler.  
Cattle food—3431—C. J. Chaplin.  
Coal, &c., machinery for getting—3441—W. Donisthorpe.  
Corsets, &c.—3424—W. S. Thomson.  
Cotton seed, utilising a certain waste material obtained in treating—3405—T. Rose and R. E. Gibson.  
Cotton, &c., presses for packing—3032—D. West.  
Dental appliances—3289—J. Wallace.  
Door knots, &c.—3401—W. R. Lake.  
Elastic fabrics—3466—A. Turner.  
Electric telegraph apparatus—3462—P. Hill.  
Engines for raising water, &c.—3399—W. M. Brown.  
Explosive compounds—3408—G. Clark.  
Fabrics, stretching and finishing woven—3476—J. Smith.  
Fabrics, woven—3398—B. Hunt.  
Fabrics, &c., beetling woven—3372—J. Parrott and W. Jones.  
Felts, manufacturing—3249—J. Anderson.  
Fences, &c., constructing—3425—M. H. Davies.  
Fire-arms, &c., breech-loading—3433—H. Henkel.  
Furnaces—3407—J. H. Johnson.  
Furnaces—3418—T. R. Crampton.  
Furnaces and fire bars—3376—W. Baker.  
Hasps and hinges—3374—F. E. Martineau.  
Hoing apparatus—3397—R. McHardy.  
Iron and steel—3419—H. Bessemer.  
Iron, machines for straightening, &c.—3482—E. Hogg.  
Iron ores, treating—3471—H. Aitken.  
Kilns for burning bricks, &c.—3402—J. L. L. Sweatnam.  
Lamp globes—3392—W. Corden.  
Liquid meters—3464—R. Beckley and J. J. Hicks.  
Liquids, separating solid matters contained in—3390—A. M. Clark.  
Looms, &c.—3447—J. Dendy and J. H. W. Biggs.  
Lubricators—3422—R. Halliday.  
Metallic caps—3388—J. Sturrock.  
Millstones, dressing—3409—J. Hine.  
Night lights, cases for—3444—E. Owen.  
Oil cake, &c., corrugated plates used in manufacturing—3346—M. Samuelson.  
Pen rests—3345—R. W. Beckley.  
Pickers—3432—S. and G. Holt.  
Pipes, &c., moulding—3451—G. Markham and W. Knighton.  
Pipes, &c., moulding, &c.—3453—C. Markham and W. Knighton.  
Planing, mortising, &c., machinery for—3389—A. M. Clark.  
Postage stamps, &c., cases for containing—3386—J. Macneill.  
Potatoes, treating—3414—T. Cain.  
Quartz, &c., crushing and grinding—3439—L. Wray.  
Railway cattle trucks—3257—W. Reid.  
Railway wheels—3472—J. H. Johnson.  
Railways, splices for connecting the ends of rails on—3406—P. B. Tyler.  
Reaping machines—3396—W. Manwaring.  
Retorts—3412—J. Gregory.  
Rock, &c., boring and working in—3383—J. Lewthwaite.  
Rock, &c., cutting—3443—J. Kellow.  
Ropes, cordage, &c.—3380—A. M. Clark.  
Salts of ammonia—3484—A. McNeil and W. Wheaton.  
Screw bolts—3420—T. Vaughan and E. Watteu.  
Screw piles, &c.—3442—G. P. White.  
Screw threads, cutting—3387—J. H. Johnson.  
Sewage water, &c., distribution of—3416—O. G. Abbott.  
Sewing machines—3440—E. Haas.  
Ships, propelling—3465—H. E. Newton.  
Ships' waterclosets—3411—J. H. Wilson.  
Ships, &c., propelling—3258—W. G. James.  
Signal apparatus for the protection of property and game—3455—W. Burgess.

Size—3459—J. B. Green.  
Sleeve-links, &c.—3020—J., F., and S. Jenkins.  
Smoking pipes—3427—F. Holmes.  
Soap—2362—E. S. T. Steane.  
Soap, cooling and barring—3393—G. T. Bousfield.  
Spindles, &c., machinery for manufacturing—3435—T. B. Collingwood and W. Hardman.  
Steam generators—3460—T. Mills.  
Sulphuric acid—3098—H. Deacon.  
Suspension bridges—3486—W. Low and G. Thomas.  
Taps—3366—A. H. Robinson.  
Telegraph wires, protecting—3224—E. O. W. Whitehouse.  
Tiles, roofing—2660—W. M. Jackson and R. Garbides.  
Timber bearers for roofs, &c.—3437—D. Griffiths.  
Tin, terne, &c.—3423—E. Madge.  
Tobacco dish and cigar and spill rack combined—3395—H. Davis and J. Parsons.  
Upholstery trimmings—3448—R. A. Dalton and G. S. Barton.  
Walls, &c., hangings and coverings for—3449—C. E. Brooman.  
Washing apparatus—3391—W. J. Criddle.  
Whales, &c., capturing—3228—F. Bennett and R. Ward.  
Yarns, dyeing and washing—3480—J. Matheson, jun.

### INVENTION WITH COMPLETE SPECIFICATION FILED.

Artificial fuel—3511—H. D. Hoskold and G. P. Wheeler.

### PATENTS SEALED.

1752. J. Reidy.	1896. H. A. Bonneville.
1755. W. Dalziel.	1903. H. Turner.
1757. T. Drake.	1904. S. Barlow, T. Edmeston, and T. Beeley.
1764. R. H. Bentham.	1905. W. Unsworth.
1788. M. Chavagnat.	1935. C. Whitehouse.
1792. O. Reynolds.	1962. M. Demmer.
1794. S. Walker.	2038. T. Restell.
1795. J. B. Farrar.	2035. C. E. Brooman.
1805. J. Avery.	2290. J. M. Hector.
1807. G. A. H. Lillie.	2378. W. R. Lake.
1842. A. M. Clark.	2841. A. Rooker.
1856. J. Gerard.	2898. J. H. Johnson.
1871. A. M. Clark.	
1895. A. M. Clark.	

*From Commissioners of Patents Journal, December 1.*

### PATENTS SEALED.

1447. W. R. Lake.	1850. W. J. Addis.
1801. E. P. H. Vaughan.	1872. G. Watson and W. J. and S. T. Baker.
1803. T. Christy.	1874. D. Coffey.
1811. L. Sterne.	1882. G. Howard.
1812. F. Schiffer.	1890. W. Hamer and J. Davies.
1823. E. Fairburn.	1897. E. P. J. L. Terrel.
1828. G. Hartley and P. Robertshaw.	2173. W. Hadfield.
1834. R. Wolmar.	2306. C. E. Brooman.
1836. J. Worth and A. Barker.	2316. R. Harling.
1841. M. Henry.	3117. W. R. Lake.
1848. F. Reddcliffe.	

### PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

3020. S. C. Salter.	3119. R. A. Brooman.
3205. M. Klotz.	3055. J. Thompson.
3041. W. E. Newton.	

### PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2955. J. Ronald.	2977. G. E. Donisthorpe, W. Firth, and R. Ridley.
2975. W. Firth and R. Ridley.	
2980. F. A. Calvert.	3009. T. Ellis.

## Registered Designs.

4975—Oct. 29—Gwynn and Fisher's hinges for sewing machines—J. F. Fisher and Gwynn, 140, Fleet-street, E.C.  
4976—Nov. 4—A shirt-front fastening—C. E. Pearce, Signal-house, Commercial-road East.  
4977—Nov. 7—Improved egg-beater—J. E. Woolf and W. Chavasse, 119, New Bond-street, W.  
4978—Nov. 13—Hat ventilator—W. W. Twigg, Birmingham.  
4979—Nov. 17—Improved hat ventilator—Richardson, Woolley, and Smith, Manchester.  
4980—Nov. 18—A tray for a cash-box—G. Gough, 217, High-street, Camden-town.  
4981—Nov. 21—A guard to be applied to the cylinders of carding engines—J. Tattersall, Preston.  
4982—Nov. 21—The gauge dram bottle—J. Yates, Birmingham.  
4983—Nov. 23—A secure fastening button—R. and J. Gough, Birmingham.  
4984—Nov. 26—A wood-turning lathe—J. Braithwaite, Crook Foundry, near Kendal.  
4985—Nov. 26—Stopper for bottles or other like vessels—R. Fenner, 28, St. John's-lane, Clerkenwell.